THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

VOL. XXII. No. 551.] LONDON, NOVEMBER 4, 1873. [25TH YEAR.] Price 1s.

RAMSAY'S NEWCASTLE CANNEL
COAL. Analysis—10,000 cubic feet of gas per ton of coal; 26-candle gas; 13¾ cwt. coke per ton of coal.
The London Exhibition in 1851 was lighted with gas made from Ramsay's Cannel.
RAMSAY'S PATENT CONDENSED COKE.
DO. GARESFIELD COKE.

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GAS-RETORTS, introduced 1828. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES, CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.
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IMPROVED DRY GAS-METERS.

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OR
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J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts in the United Kingdom; and orders for Fire-Clay Retorts of all shapes and dimensions, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
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AND
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Boiler-Tube Ferrules, Gun-Metal Gland Cocks, Water-Gauges, Whistles, &c.; Stocks, Taps, and Dies for Screwing, and Gas-Fitters Tools of all kinds.

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AND GAS APPARATUS OF EVERY DESCRIPTION.

SOLE MANUFACTURERS OF LIVESEY'S PATENT GASHOLDER MAN-LID,

By use of which Man-lid, inlet and outlet pipes can be examined and cleansed without loss of gas in crown of holder, or ingress of atmospheric air.

ROOFS, GIRDERS, BRIDGES, AND BOILERS OF ALL KINDS.

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The advantages gained by using this Machine are Accuracy, Economy of Labour, and a Check upon Fraud. The work performed by a man in any given time is shown by referring to the Index.

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NEAR LEEDS,

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FIRE GOODS, and Salt-Glazed Drain-Pipes.

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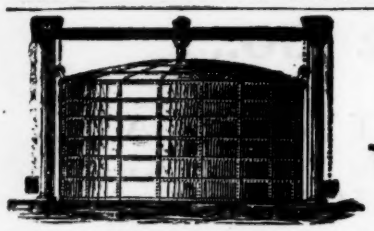
Where is always kept a Stock of Retorts, Fire-Bricks, Terra Cotta Ware, and Drain-Pipes.



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SOLE MANUFACTURERS of B. W. THURSTON'S IMPROVED SCRUBBER, CONDENSER, and WASHER, in use in many of the principal Gas-Works on the Continent.

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BOILER AND GASHOLDER WORKS,

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WROUGHT & CAST IRON TANKS

FOR DITTO,

PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS,

And all kinds of GAS APPARATUS.

Wrought-Iron Roofs, Bridges, and Girders; Steam, Hot Water, and Range Boilers; Tanks, Cisterns, &c.,

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SLIDE-VALVES,

AND ALL DESCRIPTIONS OF APPARATUS USED IN GAS-WORKS.

PATENTEES AND MANUFACTURERS OF THE

DRY-FACED CENTRE-VALVES,

Which are now so extensively used.

During the last year these Valves have been introduced into some of the large gas-works in London, where they are giving the greatest satisfaction. Favourable reports have been received from the engineers of these and of some of the most important works in the kingdom. The demand for them both for home and foreign works continues unabated.

Every Valve is made with covering bars, to protect ALL the faces. The Patentees found the necessity for this almost immediately after they commenced the manufacture of these Valves, and they have ever since adopted the practice. The large experience they have gained has also enabled them to introduce several minor improvements in the construction of their Valves. It is an advantage peculiar to these Valves that the covers can be easily raised, the faces cleaned and oiled, and kept in perfect condition. If managers of gas-works will periodically attend to this, the Valves will be as good after twenty years use as when first put in.

Messrs. COCKEY AND SONS have been very successful in the erection of many gasholders, some of very large size. They erected, in 1871, at Dublin, for the Alliance Gas Company, one of the largest in the kingdom; telescopic, 182 feet 6 inches diameter. It was referred to by the Chairman of that Company the following year, in his report to the shareholders, as having been in use, and working most effectively, since its erection, and being in the highest degree satisfactory to the Company.

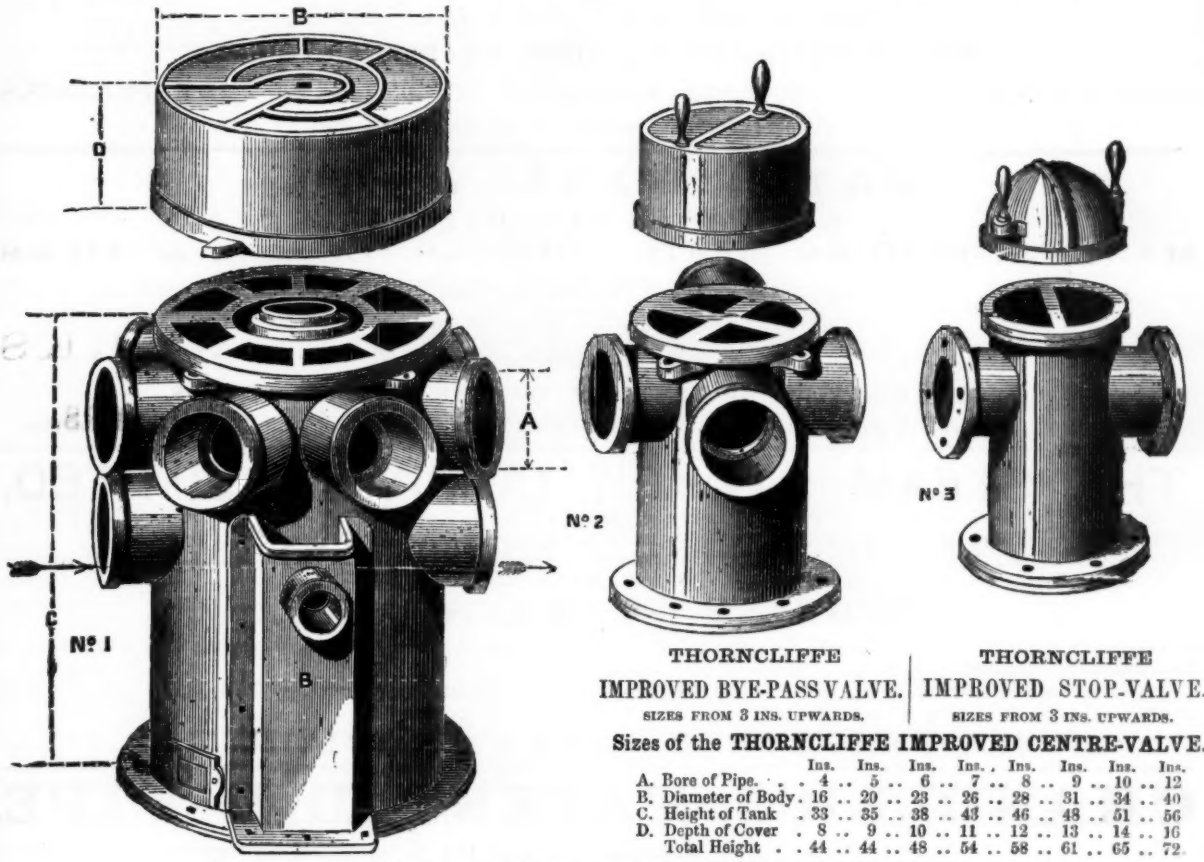
Plans of gas-works are carefully prepared, and every improvement which long practical experience can give is introduced into works entrusted to the care of the Advertisers.

References can be given to the Directors of many Companies who have placed works in their hands, and who will testify to the satisfactory results of so doing.

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD.

IMPROVED CENTRE-VALVES.



THORNCLIFFE IMPROVED BYE-PASS VALVE. SIZES FROM 3 INS. UPWARDS.

THORNCLIFFE IMPROVED STOP-VALVE. SIZES FROM 3 INS. UPWARDS.

Sizes of the THORNCLIFFE IMPROVED CENTRE-VALVE.

	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
A. Bore of Pipe. . .	4 ..	5 ..	6 ..	7 ..	8 ..	9 ..	10 ..	12
B. Diameter of Body.	16 ..	20 ..	23 ..	26 ..	28 ..	31 ..	34 ..	40
C. Height of Tank .	33 ..	35 ..	38 ..	43 ..	46 ..	48 ..	51 ..	56
D. Depth of Cover .	8 ..	9 ..	10 ..	11 ..	12 ..	13 ..	14 ..	16
Total Height . .	44 ..	44 ..	48 ..	54 ..	58 ..	61 ..	65 ..	72

In all cases the Covers are cast heavy enough to resist any required pressure.

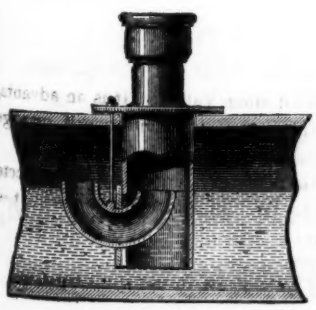
The advantages derived from the adoption of these Valves are so manifest and cardinal that in the immediate character of the change—the simplicity of the machine—the facility affording for cleaning out connexions between Valve and Purifier—the perfect collection and delivery by suitable overflow of the ammonia, at a greatly diminished depth from ground-line over the old form of Valve—the advantage of connecting on the same level, and at any angle, or opposite to each other, the inlet and outlet pipes without dip or rise—the clear acquisition of space in the purifying-house, by being able to place the boxes nearer together, the new Valve being entirely under the floor—and lastly, though of the greatest importance, the passage of crude and unpurified gas during the change is minimized to the merest fraction, thus preventing the fouling by impure gas the delicate machinery and easily affected exposed movements of the station-meter, thereby preventing the introduction of the enemy (unpurified gas) into the gasholder. Also a dead abutment is offered to all back pressure, imparting thereby to the gauges, governors, and hydraulic seals, a steadiness of action never realized with the once famous, but now fast becoming obsolete, Hydraulic Centre-Valve.

N., C., and Co. also Manufacture and Erect

PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,

And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.



Messrs. N. C. & Co. are also the Sole Agents for

HAWKINS' PATENT SELF-ACTING DIP-PIPES.

These Patent Self-Acting Dip-Pipes are rapidly coming into general use by gas companies. By their use the whole of the pressure caused by the old kind of Dip-Pipes is entirely removed, therefore the yield of gas per ton of coal is considerably increased. They also act as a perfect safeguard against the deposit of carbon (or scurf) inside the retorts.

A saving of fuel is effected, and the wear and tear to the retorts greatly diminished.

They are also perfectly Self-Acting, they being regulated solely by the gas. They cannot get out of repair, and when once fixed, will last as long as the old kind, and can be easily adjusted should the hydraulic main sink; they can also be worked with advantage where there is no exhauster.

Testimonials can be had from Herbert Unwin, Esq., engineer of the Sheffield United Gaslight Company and the Penistone Gas Company. At both these companies works they have been in constant operation for several months. Further testimonials can be had on application to the Patentee, J. G. Hawkins, Effingham Street Gas-Works, Sheffield.

For Prices, &c., apply to

Messrs. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, near SHEFFIELD.

FLETCHER AND MURPHY,

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IMPROVED CONSUMERS WET GAS-METERS

IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

AND

IMPROVED DRY GAS-METERS;

STATION-METERS OF ALL SIZES, with PLANED JOINTS;

GOVERNORS, PRESSURE AND EXHAUST REGISTERS, TEST HOLDERS,

And all kinds of Experimental Gas Apparatus.

JOHN HALL & CO.

STOURBRIDGE,

MANUFACTURERS of FIRE-BRICKS, LUMPS, & TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

THE STEAM STOKER COMPANY, LIMITED,

ARE NOW PREPARED TO GRANT

LICENCES FOR THE USE OF THEIR VARIOUS PATENTS

FOR

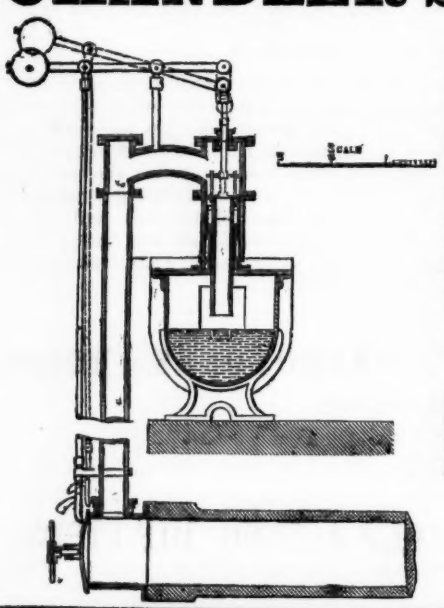
STOKING BY MACHINERY.

UNDER one or the other of their Patents, Machines can be adapted to almost any existing works without material alteration of the Retort-Houses or Settings.

Applications, accompanied by full particulars as to dimensions of the Retort-Houses, Settings of the Retorts, &c., &c., should be addressed to the Secretary, at the Offices of the Company,

155, FENCHURCH STREET, LONDON, E.C.

CHANDLER'S PATENT DIP-PIPE.



It is well known by all Gas Managers that back pressure upon the retorts greatly retards the production of gas, causing a deposit of carbon which keeps steadily accumulating. Such carbon reduces the capacity of the retorts, requires extra fuel for heating, and has to be frequently removed by heavy iron bars, which very much injure the retorts. By the use of Chandler's Patent Dip all these evils are entirely remedied. When the retorts are being drawn and charged, the Dip-Pipe is sealed in the fluid of the hydraulic main. As soon as the lids are replaced, the Dip is raised completely out of the fluid, and the gas passes unrestricted to the holders. By running the exhauster to a level gauge, ALL PRESSURE IS REMOVED FROM THE RETORTS. The consequence is that there is no deposit of carbon, no need of scurfing, no extra fuel is required, a large saving of wear and tear and loss of time is effected, and a greatly increased production of gas per ton of coal is realized.

The following testimonial letter has been received from the manager of the Erith Gas-Works:—

Messrs. Chandler and Sons.

Gentlemen,—I beg to inform you that during last week I carbonized 18 tons 5 cwt. of Ravensworth Pelaw Coal in a single setting of retorts fitted with your Patent Dip-Pipes, and obtained a yield of 195,800 feet of gas, equal to 10,730 feet per ton, which is a considerably greater yield than I have been able to obtain before using your Dip. The single retort fitted with your Patent Dip, which has now been in use here upwards of four months, has been throughout, and is now, quite free from carbon.

I am, gentlemen, &c.,

Erith Gas-Works, Aug. 2, 1873. (Signed) D. VINCENT, Manager.

For terms of use and cost, apply only to the Patentees,

Messrs. CHANDLER & SONS, ENGINEERS AND CONTRACTORS,

YORK STREET, LONDON ROAD, SOUTHWARK, LONDON, S.E.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 49, Parliament Street, WESTMINSTER.

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AND

CONTRACTOR FOR GAS APPARATUS & MAIN-LAYING.

TANGYE BROTHERS & HOLMAN,

LAURENCE POUNTNEY LANE, LONDON, E.C.,

SOLE MAKERS OF

MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH

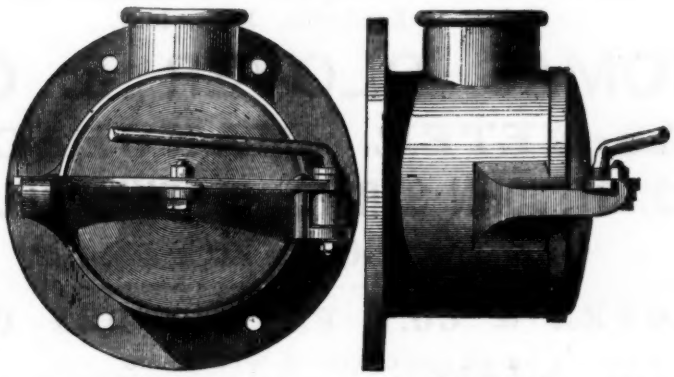
HOLMAN'S PATENT ECCENTRIC FASTENINGS.

OVER 7000 IN USE.

NO LUTING.

LIDS HINGED TO MOUTHPIECES; NO LIFTING ON OR OFF.

NO SCREWS FOR FASTENING.



FRONT VIEW. SIDE VIEW.

SIMPLE.

ECONOMICAL.

DURABLE

EFFECTIVE.

NO DUPLICATE LIDS REQUIRED.

These Lids are proved by many eminent Gas Engineers to be the most efficient, saving much time, labour, and expense; are opened and closed as quickly and with as little trouble as an ordinary furnace door, and by their use the Retorts are soundly sealed during the whole period of carbonization.

THESE LIDS ARE ADOPTED BY THE FOLLOWING (AMONG MANY OTHER) GAS COMPANIES:—

The Gaslight Company, Beckton (where over 2000 are in use).
„ Gaslight Company, Bow Common.
„ London Gaslight Company.
„ Independent Gaslight Company.
„ Phœnix Gaslight Company.
„ South Metropolitan Gaslight Company.
„ West Ham Gas Company.
„ Imperial Gaslight Company.

The Gas-Works, Royal Arsenal, Woolwich.
„ Alliance and Dublin Gas-Works.
„ Edinburgh Gas-Works.
„ Manchester Corporation Gas-Works.
„ Salford Corporation Gas-Works.
„ Rochdale Corporation Gas-Works.
„ Liverpool United Gas-Works.
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„ Birmingham Gas-Works.

The Nottingham Gas-Works.
„ Newcastle-on-Tyne Gas-Works.
„ Carmarthen Gas-Works.
„ Merthyr Tydfil Gas-Works.
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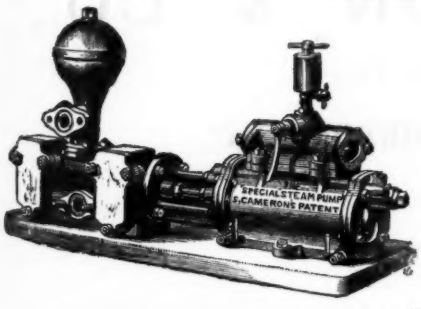

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Aylesbury	3	Cagliari	1	Kingston-on-Thames	3	Reading	2
Banbury	1	Cork	1	Leeds	1	Richmond	6
Barnet	1	Darlington	2	Lewes	3	Rio de Janerio	1
Belfast	2						

Rochdale	1	Sandbach	1
Rotherham	1	Sandwich	1
Salford	6	Southampton	1
St. Alban's	1	Stockport	1
St. Helen's	2	Stockton	1
Shipley	1	Sutton Southcote & Drypool	2
Southport	2	Tottenham and Edmonton	1
Stockton	1	Tunbridge	1
Sutton Southcote & Drypool	2	Tynemouth	1
Tottenham and Edmonton	1	Wandsworth	1
Tunbridge	1	Windsor	1
Tynemouth	1		
Wandsworth	1		
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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, NOVEMBER 4, 1873.

Notes upon Passing Events.

THE ignorance of modern history constantly displayed in society presumed to be educated is something amazing. We do not mean the history taught at schools, in those dreadful little abridgments and catechisms, which are as much like living literature as a loaf of bran is like a loaf of bread, but the modern history contained in newspapers and the reports of parliamentary debates. For instance, to listen to ordinary conversation on the question of the wages of labour, skilled and unskilled, how seldom do the talkers seem to remember that within the recollection, indeed within the experience, of living legislators, of chairmen of quarter sessions, of members of select vestries, as well as owners of land or of house property, the burning question was how the people of England were to be employed and fed. Within living memory foreign politicians, who did *not* hate England, fully anticipated that our decline and fall would be consummated by the overwhelming increase of pauperism, and consequent taxation. Within little more than twenty years farmers have opposed the use of machines, on the ground that it would create a surplus of labour that must be supported in any event; while in towns, certain industries, like the trades of Coventry and Macclesfield, had their claims for artificial protection supported by nominal free traders, on the ground that certain workmen would lose the opportunity of earning wages if their productions were not rewarded with a bonus. At present the cry is all the other way. There is no fear of surplus hand labour in any calling. On the contrary, politicians of the melancholy school foresee now that England, instead of being crushed by poor-rates and taxes, will be starved by dear coal and high wages. No one can tell what is in the womb of time, but, at any rate, the immediate benefit in the present state of affairs is a steady diminution of pauperism, which may be honestly and rapidly accelerated when the administrators of the ratepayers money get rid of old traditions and realize the new order of society, under which, instead of half a dozen being hotly in pursuit of one master, there are two masters looking after every good man, whether he is a mechanic or an agricultural labourer. In the meantime, those whose intelligence is up to the spirit of the times, who admire independence in the working man, and have no taste for the servility with which undiscriminating charity is repaid, are trying to remodel some of the institutions by which the pauper spirit is nurtured. For instance, a committee has been agitating, under the auspices of indefatigable Lord Mayor Waterlow, a change which would deeply injure the trade of the London Tavern in Bishopsgate. At the London Tavern the various voting charities hold their polling booths, have their committee-rooms, and carry out the results of corruption under the name of benevolence. In these charities, the objects of which may be truly beneficent—like the Home for Incurables, or for Cripples—or purely mischievous, as when boys and girls are taken from their relatives, boarded, clothed, and educated, generally very indifferently, without any special claim except the energetic zeal of their patrons—success does not depend on merit, on deep distress, on evidence—written, verbal, or ocular—carefully sifted, but on the money the patrons of a candidate can spend in printing, advertising, purchasing votes, and retaining adroit canvassers, male and female, especially the latter. The business of canvassing for charity subscription votes, of obtaining them by purchase, by exchange, or by solicitation, has grown into a calling as well defined as that of a commercial traveller in woollens, wines, or groceries. Of course, there are a certain number of canvassers who take up the case of their *protégés* for purely philanthropic motives, or for the sake of the excitement which others seek in hunting, shooting, salmon fishing, or a Thames punt, a line, and float; but the real business is done by professional canvassers, of whom the most successful are women—middle-aged, pleasant-looking, and not too scrupulous. A buxom *soi-disant* widow has been known to canvas every morning omnibus to the City, and every morning train, for six months, and to boast that she made £10 a week by her *charitable exertions*. But to upset this system will be more than the work of one Lord Mayor. There are too many vested interests, secretaries, solicitors, treasurers, and committeemen whose profits, or importance and patronage would be destroyed by a rational system, a small responsible committee, and the publicity of truthful annual reports. The meeting at the Mansion House on Thursday last quite realized our expectations. The Earl of Shaftesbury, the perpetual and almost professional chairman of charities of all kinds; the Marquis of Salisbury, the most Conservative of peers and a distinguished administrator; Mr. Walter, M.P., whose position as proprietor of *The Times*, and reputation for wealth, make him the sure mark of every charitable projector; Lord Mayor Waterlow, who has taken up an unpopular side from sheer force of conscience, although no man more dearly loves popularity; the Marquis of Westminster, who subscribes to pretty nearly every metropolitan charity; Colonel Beresford, M.P., a Conservative of the old sort; all agreed in denouncing the present canvassing system of subscription charities; but Jack Wilkes's answer to the man who threatened to take the sense of a meeting—"I will "take the nonsense of the meeting, and beat you two to one"—was more than realized. The broadcloth mob would not have a committee or an inquiry, or listen to evidence. The House of Commons, which would not listen to the idea of enfranchizing Birmingham at the expense of the rotten borough of East Retford, was not more tumultuously hostile to a minimum of Reform; but the Reform Bill passed for all that. The only person of any ability or position who supported the present system of organized corruption was Mr. Charles Reed, the Radical Nonconformist M.P. for Hackney; but there are excuses for him—his father, Dr. Reed, was the great founder of the system. He made his own importance, and that of his son, by his energy in creating several mischievous charities.

The Metropolitan School Board have prepared for the close of their term of office by giving an account of their work. Called upon to administer the education of all the children below the middle class, in a population of three millions, with no reliable information, no settled line of action, it has been unreasonably charged against them that they talked too much, and made too much preparation before beginning. It might just as well be complained that before building a hospital, time was wasted in preparing accurate plans and estimates, and digging foundations. There is a vulgar and true saying, "that "fools and children should never see any work half finished." In the case of the work of the Metropolitan School Board—the greatest educational work ever attempted by one body of men—the London ratepayers, through the newspaper reports, not only saw the work unfinished, but actually watched the progress of "thinking out the "most important question." The following paragraphs give an account of work actually achieved. Three years ago there was no complete list of elementary schools in existence. Such a list had been compiled from a form prepared by the Education Department. The first returns showed that the voluntary schools in existence, created or projected, since December, 1870, afforded 300,000 places for scholars. Of these, all were efficient except 14,000 places, which, time having been given, were brought up to the standard. According to the best information that could be obtained, London should have 560,000 school places. But in a place like London no general theory would hold good for such different places as St. George's, Hanover Square, and for Ratcliff Highway; the Board, therefore, instituted a house-to-house inquiry, founded on the census, with the name of every child of school age that slept in London on the 2nd of April, 1871. From this they came to the conclusion that 112,000 places would supply the elementary education of the metropolis. These will be supplied in about two years. The Board have carefully studied the subject of school architecture and school furniture in a practical, not an æsthetic point of view, like too many enthusiasts:—

They have increased the number of class-rooms. Wherever possible, they provided adequate playgrounds, and have given 9 square feet of flooring, instead of the 8 of the New Code, for each child, in the graded schools. In one particular instance they have erected, as an experiment, a school in Jonson Street, Stepney, on the system of class division, so that every class has a distinct room, and is under the charge of a certificated teacher. It is the belief of those who have taken an interest in the establishment of this school, that the educational results will far more than compensate for any additional outlay on this description of building. Before the end of November 36 new permanent schools will be ready for occupation, with accommodation for 35,879 children. This number includes 17 in which, although so recently opened, there has been an average attendance of more than 10,000 scholars. In addition to these 36 schools, there are 28 in course of erection; and again, 22 others where the contracts have been signed, or will be ready for signature, within this month. The total number of new permanent schools so far provided for is, therefore, 86, giving an accommodation for 79,625 children. It is probable that the buildings will work out at something like £7 10s. per head, and the sites at about £3 10s. per head—making a total cost of about £11 per head. Taking into account the price of land in London, as well as that of labour and materials, the Board are of opinion that this cost cannot be considered unreasonable, and that it will contrast not unfavourably with schools erected in other parts of the country.

Up to the present time, 75 schools, with accommodation for over 20,000 children, have been taken only; out of these the accommodation of 7000 children was unfit for school purposes. They would, therefore, be gradually transferred to new schools.

In most of the above cases it might be assumed that, unless the Board had taken the schools over, the managers would have been unable to continue them for any length of time from want of funds; and the result of the transfer had been that the premises have been rendered more healthy, the school apparatus increased, or the instruction improved by the substitution of certificated for uncertificated teachers. . . . . The London Board scholars were found in three descriptions of schools—in schools transferred, in buildings permanent or temporary; in schools hired; and in new permanent schools. According to the last quarterly return there were then on the rolls of Board schools 50,234 scholars, with an average attendance of 32,733. These scholars were in 169 buildings, of 252 departments, and were under the charge of 149 certificated masters, 244 certificated mistresses, and 971 pupil teachers and candidates.

The Board have not fallen into the ordinary error of official minds, and tried to do all the work themselves. The late architect of a public body would not approve of a design, even for a chimney stack, until he had put his pencil to it. His office was soon blocked up with common builders work. The Board quote from the report of a sub-committee:

The amount of detail in connexion with the establishment and management of a new school is necessarily very great, and the Board would have found considerable difficulty in the matter if they had not been relieved by the voluntary aid of ladies and gentlemen in the different districts, who took an interest in the cause of education. In the case of schools transferred to the Board, the plan has been for the original trustees to nominate four persons for appointment by the Board as managers, while the Board have themselves selected four or five other persons, who were also interested in the locality. In the case of new schools, the Board, of course, have had to select all the managers; but in these cases, too, they have had recourse as far as possible to local aid. With the managers thus selected has rested the entire initiative as to the character of the school, the amount of the fees, the number and salaries of the teachers, and the books and apparatus to be used. On the whole there are 113 bodies of managers (two, or three, or more schools being sometimes grouped), comprising 747 ladies and gentlemen, exclusive of members of the Board. Among these managers there are 74 clergymen and ministers who, as it happens, are divided nearly equally between the Established Church and other denominations.

As to the difficult subject of compulsion, the Board were long occupied in framing the needful machinery, and could not get to work until the spring of 1872. They had, beside preparing the bye-laws, to appoint ten divisional committees, a superintendent, and a visitor for each division.

Scarcely any serious instance of opposition to the Board visitors has arisen, the machinery has worked smoothly, and, as a result, comparing the spring of 1871 with the present time, there has been an increase in the average attendance at efficient schools of nearly 60,000 children. (The number by the roll is considerably more.) In addition to this, it is known that there has also been an increase in the attendance at inefficient schools. This, however, though sometimes due to the desire of the parent to escape surveillance, is chiefly due to the want of efficient school accommodation in the neighbourhood, and the evil may therefore be expected, by-and-by, to diminish, and ultimately to cease altogether. If the above addition to the average attendance be analyzed, it will be found that about 33,164 of the increase is referable to voluntary schools, and 26,261 to Board schools—a fact which disposes of the allegation that the Board, whatever isolated case may exist here and there, is systematically drawing its scholars from voluntary schools.

The above abridged extracts give the most valuable facts and figures of a book which may frighten some persons interested in education, by its bulk. In conclusion the report says:

The first School Board for London cannot hope that, in a task so laborious and so complicated, they have fallen into no error. But to the best of their knowledge and ability, sparing neither time nor labour, they have endeavoured to carry out the work which was entrusted to them. Up to the 25th of October there have been held 1092 meetings—viz., 121 Board meetings and 971 committee and sub-committee meetings. In addition to this, the meetings of the divisional committees and sub-committees, in connexion with the enforcement of the bye-laws, have considerably exceeded 1000. They have taken measures to provide for the great educational deficiencies of a metropolis of 3,356,000 inhabitants. They have framed regulations for their schools, which they believe, as time goes on, will tend to raise the standard of education throughout the country. They have organized a machinery for ensuring gradually the regular attendance at school of all children of school age.

Sir William Fairbairn, having, we are happy to find, recovered from his serious illness, has been able to write an opening address, which was read on the 28th of October to the Manchester Scientific and Mechanical Society, of which he is president. In this address he asked a question which we shall take the liberty of answering:

It dwelt largely on the necessity of a knowledge of first principles. The age of the rule of thumb is at an end, and all designs and constructions must be founded on the unalterable laws of scientific truth. In the professions of engineering and mechanics an inexhaustible field is open for discovery and improvement. He pointed to the low ebb at which mechanical science was fifty years ago, and how much we are indebted to the late Mr. Roberts and Sir Joseph Whitworth for the introduction of new and more perfect tool machinery, which by constant adherence to first principles, has given to the profession not only machines of mathematical precision, but largely endowed it with almost a creative power—as one machine creates another, and that upon self-acting principles—which we witness daily in use. Sir William said he was at a loss to discover why these professions were so far behind others that had made greater progress. He looked for it in vain in the complexity of construction, but if we look to other professions, such as that of surgery and medicine, we should bring forward names of high distinction in succession, and whether it be in the phenomena of animal and vegetable life, or some other cause, we have the most elaborate experiments on the organism and functions of animal life, and we have also the mechanism of the bones, joints, and sinews exhibited in the economy of first principles as founded on natural laws. It is the same with vegetable life, and all other questions connected with physiological investigations. It was only the other day that he received a copy of a paper "On the Structure and Development of the Scales and Bones of Fishes," by Professor W. C. Williamson, of Owen's College, in which he states that it is impossible to study the distribution of these calcareous tissues without being struck with the way in which they are adapted to the purpose of strengthening the scale, and by maintaining its slightly arched form enabling it to resist a large amount of external pressure. The dynamic principle displayed in the arrangement of the horizontal lamina strengthening the dome is precisely the one acted upon in the construction of the small compartments—meaning the cells—of those recent triumphs of engineering art, the tubular bridges. On a knowledge of first principles, it may safely be said that this knowledge, derived exclusively from experimental research, has founded the laws on which iron horizontal bridges are now constructed.

Sir William suggested several subjects requiring careful scientific investigation, especially the "procuration and use of steam." The reason why questions of physiology and chemistry are continually the subject of theoretical investigation, is that they are pursued by a class of students whose reward is found in the love of their pursuits or ambition for fame; to money rewards they do not look; but the mechanic who does not make a fortune is a poor inventor, and has no time for abstract investigation. The mechanic who founds a great fortune is generally occupied, at the contemplative time of life, in practising the agreeable arts of an English country gentleman and sportsman. Since James Watt, the watchmaker, devised the modern steam-engine, and George Stephenson, the rough, uneducated, or self-educated, coal-miner, planned in his head the whole of our railway system—since Roberts, since Whitworth revolutionized the manufacturing of machines, nearly all the greatest improvers of mechanical arts have been working mechanics, filled with the fire of genius and enthusiasm. For this selfish reason, if no higher motive, strenuous efforts should be made to place within the reach of every man engaged in a technical trade the means of learning the principles of his pursuit.

Lord Mayor Waterlow presided the other night over a meeting of the committees of the City Companies, to consider the question of technical education. He proposed a very modest and practical scheme —"That the City Livery Companies, some of whom were giving away "small sums (not equal to the value of the dish-washings of their "banquets) in contemptible prizes, should combine to raise ten thou-"sand pounds, and construct a building on the Holborn Viaduct, or "some other suitable site, where the elements of science and art, and "other matters connected with the trades of the City, should be ex-"plained and taught in classes and by lectures to such workmen and "apprentices as choose to avail themselves of them. There should "also be a public lecture-room, in which, from time to time, and by "rotation, articles of skilled workmanship sent in for competition by "each handicraft could be exhibited; and classes or lectures given on "the subject of the various forms of industry with which the com-"panies were nominally connected. Those lectures, if the funds ad-"mitted, might be delivered to the men gratuitously, or, at any rate, "on the payment of a very moderate fee. This would be a beginning, "of course." The sum named is childish; but Sir Sydney Waterlow knows whom he has to persuade to take the first step. A library of books of reference, a laboratory, and the needful apparatus for scientific lectures and classes, would take twice the sum. He was supported by Mr. Grissell, master of the Ironmongers Company; Mr. Spicer, late prime warden of the Fishmongers Company; Professor Tenant, master of the Turners Company; Mr. Charles Barry, the architect (?), first warden of the Skinners Company; Mr. Reeve, of the Tallow Chandlers Company. Mr. Daniel Watney, jun., late master of the Mercers Company, and a gin distiller, opposed the plan, and, probably, if he had been candid, would have expressed his dislike to education of any kind for the class named, and especially for any tax or subscription from the Mercers Company. His speech should be read with Sir William Fairbain's. The Mercers Company are the patrons and trustees of St. Paul's School. Each member of the court has the right to nominate a scholar—a profitable piece of patronage. They are also the trustees of that remarkably useless institution, Gresham College, and of a vast income for charitable trusts which have long ceased to be useful to any one, such as releasing prisoners for debt, and for doles of the most mischievous character. As the Mercers Company are one of the twelve great Liveries, the fees to the court are splendid, the banquets frequent and costly. Mr. Daniel Watney apparently loves patronage, banquets, and sham lectures, and does not see the use of science, being always able to buy or hire all the science he requires to conduct his business or adorn his hospitable board. Mr. Watney has many sympathizers in the City not all so candid or outspoken. Amongst the supporters, the Ironmongers Company seems likely to have some spare income. The wealth of the Fishmongers is proverbial. The Turners are a very small company, with no apparent landed or funded property, or even a hall to let, like the wealthy Silk Weavers. The Skinners are, it is to be presumed, poor, as the fees on admission are very low. The Mercers fees are "variable." The Tallow Chandlers seem to have a hall of their own, and some tenements in Cornhill and Bishopsgate, bequeathed to them in 1481, for giving charcoal to the poor of two parishes where, at present, there are no poor. The charcoal has been commuted for a few pounds, but what the rents produce Collingridge's *City Directory*, from which our information as to the status of the various Liveries is derived, does not state.

Mr. Henry Cole, C.B., pensioned and independent, with a new salary from the commissioners who own the South Kensington estates, has been appearing in a new character, energetic and amusing as ever, and just as candid. He has lost no time in striking a blow for his judicious patrons the commissioners. The place chosen, Hanley; the occasion, the annual meeting of the School of Art—the principal of four Schools of Art in the Pottery district—were, if appropriate, not very important, unless Mr. Cole means to close his active life by entering Parliament as the M.P. for Art and Science. But Lord Palmerston used to make speeches that all Europe read, at the small town of Tavistock; and as Mr. Cole secured a full report of his carefully prepared speech, jokes and sarcasms included, in the leading journals, his object was gained. And it must be confessed that there was a good deal of stuff in the Hanley address, although "sicklied o'er" with the usual mawkish adulation of that highly respectable Prince, the late Prince Consort. Mr. Cole praised himself under cover of the Prince's memory, as he had a perfect right to do. There are a great many persons who object to King Cole as

the Autocrat of Art and Science, who are quite ready to give him credit for having solidly served his country while he served himself. He tells that in 1847 the school of Hanley was founded, and in the first five years the average number of students was 67, and there were in England only 20 art schools, nearly all struggling with debt and difficulties. There were no elementary drawing schools for the labouring classes; no attempt at scientific instruction; no training school for teachers, and the total number of pupils did not exceed 5000; no museums of an industrial character. Then came the Hyde Park Exhibition—a brilliant success, which Mr. Cole and his friends have since imitated year after year with more and more absurd failures, until we have come down to an exhibition of bride cakes and Cavendish dish tobacco. At present, thanks to Mr. Cole and South Kensington there are 122 art schools, 22,000 students paying £24,200 in fees. There had been created, since 1854, 950 science schools, with more than 36,000 pupils. In elementary schools, nearly 200,000 children were taught drawing. The art library of South Kensington was used, in 1872, by 19,000 students, and the educational library by 15,000 clergymen, teachers, and others interested in education. The Kensington Museum circulated, through local exhibitions, upwards of 5400 paintings, models, &c., all excellent as far as they go.

The Science and Art Department have succeeded in settling that the Natural History Department of the British Museum shall be transferred to South Kensington, as soon as the building in course of construction is completed. This victory, long resisted by the Museum authorities, promises to prove fatal to the victors. It is now proposed to transfer the control of the Science and Art Department from the Lord President of the Council to the authorities of the British Museum. The Marquis of Ripon, who has recently been succeeded by Lord Aberdare, "succumbed to malevolent influence "before he resigned office." Against this change to the control of fifty irresponsible trustees, which include all the great officers of State, Mr. Cole protested with genuine indignation. He described the condition of the Museum in 1850, from the report of a Royal Commission. We do not think the present administrators of the British Museum would quite admit the correctness of the description in 1850; but there can be no question that the governing powers of that venerable institution are not quite the men to manage South Kensington. The following description of the superior management of South Kensington, and indirect, but really deserved, praise of the great Cole, is not bad:

> The Hanley student, he said, came up by railway, which put him down within some 200 yards of the Museum. He found the place open every day in the week at ten o'clock. It was never closed for cleaning and repairs, and if His Grace the Archbishop really desired to do the work, he could tell him the secret of it. It was open on three days of the week until ten o'clock at night. The student could consult the art library and educational library by showing his school ticket, or he might get admission for a week for 6d. He could draw any object he saw; he could eat when he pleased; he found every object labelled, and was told what the nation had paid for it. He found chairs and benches in plenty to sit upon, and he could wash his hands if he wanted to do so. He found the lighting perfect; everywhere he could see appropriate, new, and unobtrusive decoration. The clean mosaic and tiled floors contrasted favourably with the dusty brown-paper coloured floors of the British Museum. The buildings were cool in summer and of equal warmth in winter. He could breathe freely and get no headache. He could look at the jewellery and the priceless gems lent by the Duke of Marlborough and the Duke of Devonshire and Mr. Beresford-Hope, without disturbing or boring a very learned keeper.

But Mr. Cole, in commencing his tour of agitation, forgot very naturally to tell his audience that if any additional power is given to the trustees of the British Museum it will be accompanied by a radical change in its constitution. A reduced number and a paid chairman have been recommended long since by a Royal Commission. If the Science and Art Department is to have all the money it requires, it will certainly require a Board to look after it. Perhaps the paid chairman of the Board may not be so manageable as a busy President of Council. Surely, in all England, Mr. Cole, with all his talents, and all the talents of his interesting family connexions and relations, kindly placed by him at the service of the Science and Art Department, is not the only person fit to direct science and art. If the attempt to absorb the British Museum, the College of Chemistry, the Museum of Geology, and every kindred institution in South Kensington, end in making a small competent Board of Art and Science out of the incongruous elements of the Museum trustees, the nation may have to thank Mr. Cole for something he never intended.

Circular to Gas Companies.

THE special legislation respecting gas undertakings in the past session, of which we give a summary to-day, offers little of interest, and may be regarded on the whole with satisfaction. It is true that every year gas companies are strictly limited as to profits, on the score that they enjoy a monopoly, while railway companies, who are as much monopolists, are left free to make as much as they can or will, and that gas companies are strictly bound to their engagements with their customers, while the bonds which hold a railway company are of the loosest possible character. But we must not complain of this, nor of the clause always inserted at the dictation of Lord Redesdale, which enacts that no share in a statutory company shall be of less nominal value than £10, the effect of which is to exclude small capitalists from participating in the profits of gas undertakings, and to give their voices to the opposition whenever a contest happens between a gas company and a local authority. It would be to the advantage of companies to spread their shares as widely as possible among all classes of the community, but the operation of the clause we speak of obviously stands in the way of enlisting in a common interest a large number of people who have no opportunity of investing their savings at such good interest as they might obtain from a gas undertaking.

In the Acts we have recapitulated, the interests of established undertakings have been tolerably well cared for. The one "filibuster-"ing" Bill of the session received small consideration, and the Durham Gas Company is now free to pursue undisturbed a prosperous course. Those Acts which provide for an increased maximum price —*e.g.*, the Brighton and Gosport Acts—would constitute valuable precedents but for the inevitable introduction of the Board of Trade with their expensive inquiries. Why the simple process prescribed by the 35th section of the Gas-Works Clauses Act, 1847, for obtaining a reduction of price should not have been prescribed by these Acts we altogether fail to see. It must be remembered, however, that the appointment of commissioners puts some valuable patronage into the hands of the President of the Board of Trade for the time being, and furnishes remunerative employment for briefless barristers.

The auction clauses in the Acts afford some curious points for notice. At Lincoln the shares are first to be offered to shareholders, and if not accepted are to be put up to auction. At Neath they are to be put up to auction, and if not sold are to be offered to shareholders. In the former case any reserved price is not to be *more* than the nominal value of the share; in the latter it is not to be *less* than the nominal amount. Additional interest will be given to these clauses by the statement in the preamble of the Bristol Gas Act that the company realized premiums to the amount of £65,489 on the sale of shares of the nominal value of £80,000. This result shows the confidence felt in the stability of gas undertakings.

The case of the Lincoln Gas Company is a peculiar and instructive one. Untrammelled by the general Acts, they have gone on extending and improving their works out of profits, and Lincoln has been as well supplied as any city in the kingdom. This year it was considered advisable to apply to Parliament, and the expended profits, £36,500, have been capitalized as improvement stock, with a 5 per cent. dividend. The company is now brought under all the general Acts; but Lincoln will be no better supplied than before. The shares which have sold at the rate of £70 per £25 share, will now fall to a normal price.

In two Acts novel provisions have been introduced. The Belfast Act, for example, gives the company or their assigns power to redeem the new capital authorized after five years. The new capital is only £20,000, a very unimportant sum for such a company, so it is probable that the undertaking will soon pass into the hands of the Belfast Corporation. As it stands, however, the provision we mention is unique in a special Gas Act. So too, we believe, is that section of the Neath Gas Act which empowers the company to form a contingency or renewal-fund as well as a reserve fund, and makes such fund applicable for increasing the dividend of any year. In this case, also, the peculiar enactment may indicate that the undertaking will soon pass into corporate hands, power to dispose of and purchase being conferred by the Act.

We remark with satisfaction that with the exception of the Scottish Corporation Acts, and the Over Darwen Company's Act, no Act compels the supply of more than 14-candle gas. Why our northern neighbours should be in such haste to use up their cannel we cannot imagine, but we feel certain that before many years they will have to content themselves with gas of less than 20-candle power, if that quality is only to be obtained by the use of cannel. As regards maximum prices, it is impossible to read without a smile a clause which, as in the Neath Act, fixes a maximum for *twelve years*, and provides for a reduction after the expiration of that time. Who can guess what will happen to our industry in the course of the next twelve years? Is coal likely to be cheaper at the expiration of that period, or will some new invention supersede the use of it? For our own parts we do not anticipate either event. It will be an evil day for England when coal gets cheap again, and the art of extracting sunbeams from cucumbers is still undiscovered.

We have noted above how the Board of Trade have set their mark on the legislation of the year as regards gas companies, and we may also note here, although it does not concern companies, how the Local Government Board have further intruded, consistently with the centralizing spirit of the times, into the affairs of local authorities. The Local Boards, who have power to borrow money for gas or water undertakings, which is to be paid off by means of a sinking-fund, are now required to transmit to the Local Government Board every year a statement of the amount invested for the fund, a description of the securities in which it is invested, and also a return of the purposes to which any part of the fund has been applied during the period; and if it appear to the Local Government Board, by such return or otherwise, that the Local Board have failed to set apart the sum required for the fund, or have misapplied any portion of the moneys set apart, the central authority may order that a sum not exceeding double the amount in respect of which the default has been made shall be set apart and invested, and the order may be enforced by writ of *mandamus*. Parental government can hardly go further than this. It is sad to think that the country gentlemen and respectable tradesmen who constitute Local Boards cannot be relied on to carry out honestly the obligations imposed on them by Acts of Parliament; but this clause, suggested no doubt by experience, seems to insinuate that they cannot. We are certainly no friends to centralization, but at the same time we cannot free our minds from a suspicion that without some central supervision half the Local Boards in the country would be bankrupt within ten years.

The Corporation of Nottingham have resolved on renewing their assaults on the gas and water companies, and have requested the town-clerk to prepare notices of a Bill, or Bills, for taking over the companies. As the directors of both companies object to sell, a parliamentary contest of more than usual interest may be expected.

The changes in the direction of the Dublin and Alliance Gas Company have resulted in the retirement of Mr. Stevenson, the secretary—his reduced salary being converted into a pension—and, strange to say, the appointment as his successor and general manager of Mr. Cotton, the chief gas examiner and tester to the Corporation of Dublin. In his evidence on the Dublin Gas Bill, before the House of Commons, Mr. Cotton showed what a profitable thing the undertaking would be in the hands of the Corporation. Let us hope he will make the concern profitable to the unfortunate shareholders. We do not know what terms of purchase the Corporation will offer in their intended bill, nor what steps the shareholders will take for the protection of their interests, but it seems to us that there is still work for a committee of shareholders to do in preventing the confiscation of their property.

The Corporation of Manchester postponed making an alteration in the price of gas until after the elections to the council, which took place on Saturday last. We should have been glad to see gas made a test question at the elections. We have urged in former times that gas was too dear in Manchester. It is sufficient now to say that if the gas undertaking pays its expenses, and provides a reasonable sum for depreciation, the consumers ought not to be further taxed for the benefit of the water-works or for improvements.

The interest excited by the patent of Mr. Skoines, for improvements in the manufacture of gas, induces us to give the specification at the earliest possible period, with full illustrations of the arrangements. The process appears to be simply this: Coal is distilled in one or more retorts, and the raw gas, instead of passing at once to the hydraulic main, is carried first through a second retort containing chalk, where it meets with a current of superheated steam. The steam and gas then pass on together through a third retort filled with coke, maintained, of course, in a state of incandescence, and thence the mixture goes on to the hydraulic, condensers and purifiers in the ordinary way. The result of these operations is said to be a very large yield of gas perfectly free from ammonia, nearly free from sulphur, and of high illuminating power. The constituents of raw gas are, of course, well known to our readers, and we have to consider what may happen in the second retort containing lumps of chalk at a red heat. By the time chalk arrives at a red heat it has, of course, lost its carbonic acid, and caustic lime remains. Sulphuretted hydrogen passing over red-hot lime will be decomposed, the sulphur combining with the lime, and the hydrogen passing on. Ammonia, too, will no doubt be decomposed, and its constituent gases, nitrogen and hydrogen, will be carried along with the other gases. Bisulphide of carbon may also be broken up in this retort, especially if some portion of the steam be decomposed. But here we have doubts. Water requires a most intense heat for its decomposition, unless some agent be present capable of uniting with one or the other of its elements. Lime is quite incapable of promoting the decomposition, and we are inclined to believe that the steam goes along unchanged to the third retort containing incandescent coke. What happens here we had occasion to describe in connexion with the process of the New Gas Company—carbonic oxide, carbonic acid, and hydrogen are produced—which, no doubt, contribute considerably to the bulk of the gas. Thequestion remains—What happens to the tarry matters in the second and third retorts? No doubt much is broken up into gas; and it must be remembered that this breaking up is always accompanied by the deposition of carbon. Should this happen in the second or chalk retort, it may well be imagined that the finely divided carbon, meeting with superheated steam, is at once burnt up, to produce the gases we have mentioned as formed in the third retort. This will account for the lime remaining clean as reported. In the third or coke retort exactly the same decompositions aud combinations will be repeated, and it may be remarked that this decomposition of the steam will remove the charcoal obstruction, which might otherwise, as in the Eveleigh process, interfere with the free passage of the gas. As the final result of these operations, and after purification, we have, of course, ordinary coal gas *plus* the extra proportion of hydrogen and carbonic oxide. It may perhaps strike the reader that after all this invention is little more than an amalgamation of the patents of Mr. Basford and Mr. Ruck, the chalk retort being a novelty. We have only described the process as we believe it is actually worked, and as we venture to say it can only be worked. The patent, as is usual with patents, specifies a good deal which is nonsensical and impracticable. One paragraph it will be seen, claims the New Gas Company's process pure and simple. What will result from passing gas, at any temperature it is likely to reach, through tallow, beyond the production of some stench, we are rather at a loss to know.

In justice to the inventor, we give some results obtained in working the process described above, as certified to by eminent engineers. With Longrigg coal, 20,800 feet of gas of 16·70-candle power; Pelaw Main, 18,000 feet of 16·47-candle power; Wigan nuts, 16,000 feet of 16-candle power. It only remains to be added that the residual coke is of the usual quality. There will, of course, be no other residual of value beyond a little pitch.

GAS LEGISLATION IN 1873.

In the past session of Parliament thirty-one Acts relating to gas undertakings received the Royal Assent. Seven of these incorporate companies were previously without statutory powers. They are as follows:—

The *Aberystwyth Gas Act* provides for the dissolution and reconstitution of the Aberystwyth Gas Company, previously regulated by a deed of settlement. The share capital of the original company was £8000, in £10 shares. This Act gives the incorporated company power to raise £15,000 additional capital in £10 shares, the dividend on which is not to exceed 7 per cent. if ordinary, or 6 per cent. if preference. The usual borrowing powers are granted, and the company may issue debenture stock. Power is given to take certain lands belonging to the Corporation within three years, if required by the Corporation; if not, within ten years. The company may provide and form a fund (out of profits) for the purchase of the fee simple of this land, neither the fund nor the proceeds thereof being deemed divisible profits; but when a sum adequate for the purchase has been provided, the interest on the money may be deemed divisible profits, and be applied accordingly. Gas of 14-candle illuminating power, tested by any Argand burner consuming 5 feet per hour, is to be supplied at a maximum rate of 6s. 8d. per 1000 feet within the borough of Aberystwyth, and 7s. 4d. beyond.

The *Bournemouth Gas and Water Act* incorporates the Bournemouth Gas and Water Company, Limited. The subscribed capital was £50,000, of which £37,000 has been paid up, and they have no mortgage debt. This Act authorizes the incorporated company to raise additional capital to the amount of £50,000, the dividend on which is limited to 7 per cent. or 6 per cent., according as it is raised by ordinary or preference shares. Borrowing power to the usual extent is granted in respect of both old and new capital. The gas supplied is to have the illuminating power of 14 candles, tested by Sugg's new London Argand No. 1, with chimney according to circumstances. The maximum price is 6s. 6d. within the limits of the town of Bournemouth, and 7s. beyond. The Act provides that public lamps may be supplied on average meter indication, one meter to 10 lamps—the meters being provided and fixed at the joint expense of the company and the Bournemouth Commissioners. In case of a dispute respecting the charge for public lights, the matter may be referred to arbitration. In such event, the arbitrators or umpire are to take into consideration the price of coal, but are not, under any circumstances, to fix a higher price than the lowest charged to a private consumer. The Act confers all the powers usually accorded to gas companies.

The *Chigwell, Loughton, and Woodford Gas Act* incorporates the Chigwell and Woodford Bridge Gas Company, Limited. The original capital of the company was £15,000, in 3000 £5 shares, and £6000 have been raised on mortgage. It is now to be divided into 1500 shares of £10, and the company is authorized to raise additional capital to the amount of £25,000, in £10 shares, the dividend on which is limited to 7 or 6 per cent., as they are ordinary or preference. The Act recognizes the existing mortgage debt, and authorizes the reborrowing of the same (£6000) if paid off. On the additional capital of £25,000 the company can only borrow £4000, under the usual conditions. Gas of 14-candle power is to be supplied, the maximum charge for the next ten years being 7s. per 1000, and after the termination of that period 6s. per 1000 feet. The test burner is to be Sugg's new London Argand No. 1, with chimney according to circumstances. All the usual powers of gas companies are granted.

The *Durham Gas Act* dissolves and reincorporates the City of Durham Gas Company with all acquired rights and liabilities. The original capital of the company is £30,000, in shares of £10 each. By this Act power is given to raise £42,000 of additional capital, which is to include £1500 already raised. The dividend on this additional capital is not to exceed 7 per cent. if in ordinary shares, or 5 per cent. if preference. Borrowing powers to the usual extent and under the common restrictions are granted with respect to the original capital (the old company having no mortgage debt) and the additional. Borrowed money may be converted into ordinary or preference stock at a maximum dividend of 5 per cent. Debenture stock may be issued. Ten acres of additional land may be purchased by agreement, but manufacturing can be carried on only on the lands now held. The price of gas is to be 4s. per 1000 within the limits of the existing parliamentary borough, and 5s. beyond. The illuminating power is to be 14 candles, and gas is to be supplied at a pressure of 7-10ths and one inch within the usual hours.

The *Harrow Gas Act* incorporates the Harrow Gaslight and Coke Company, Limited, started last year to purchase the private undertaking of Mr. John Chapman. The original capital was £30,000, in 3000 shares of £10 each. Of these shares 2930 have been subscribed for, and £23,371 has been paid up. The purchase-money for the land and works was £24,359, of which £19,359 has been paid; and the limited company have from time to time improved and enlarged the works, and in the purchase and improvements have expended a sum equal to the present share capital. This Act authorizes the incorporated company to raise further capital to the extent of £15,000, the dividend on which is limited as usual. Borrowing power to the usual extent is granted in respect of original and additional capital. The company are to supply 14-candle gas, tested by an Argand burner consuming 5 feet per hour. The maximum price is 6s. within a radius of one mile from the King's Head Hotel in Harrow, and 6s. 8d. beyond. All the usual powers are conferred by the Act.

The *Pontefract Gas Act* incorporates the Pontefract, Tanshelf, and Carleton Gas Company, Limited. The original capital was £16,000, in £10 shares, the whole of which have been subscribed, and more than one-half paid up. This Act authorizes the company to raise another £16,000, the dividend on which is limited as usual. Borrowing power to the usual extent is granted in respect of both old and new capital. Gas is to be supplied of 14-candle power, tested by Sugg's new London Argand No. 1. The maximum price is 5s. 6d. per 1000 feet. All the usual powers of a gas company are conferred.

The *Pontypool Gas and Water Act* incorporates with statutory powers the Pontypool Gas and Water Company, previously incorporated under the Companies Acts, 1862 and 1867. The original share capital consists of £13,200 stock, and a like amount in 1100 shares of

£12 each. This Act authorizes the company to raise another £13,200 in new shares, ordinary or preference, of the amount of £10 each, or as stock. The dividend on this new capital is limited to 7 or 6 per cent., according as the shares are ordinary or preference. Power is given to borrow in respect of the original capital £6600, to include £4500 which has already been raised by debentures. In respect of the new capital the company may borrow a further sum of £3400 when the whole of the new capital has been issued, &c. All the usual powers of a gas company are conferred. Gas supplied is to have the illuminating power of 14 candles, tested by the new London burner No. 1, or some other burner to be approved by the Board of Trade. The maximum price is 5s. 6d. per 1000 feet.

Fourteen Acts confer additional powers on companies already incorporated.

The *Belfast Gas Act* empowers the Belfast Gaslight Company to raise additional capital to the amount of £20,000. The present capital of the company is £200,000, and they have a mortgage debt of £23,380. The new capital is to be raised by the issue of preference shares, which are to be disposed of by the directors to such persons and on such terms and conditions as may be thought advantageous to the company, not less than the full nominal amount being paid. The dividend on the new capital is limited to 5 per cent. A peculiar feature in the Act is that provision is made for the purchase and redemption of these shares, after the expiration of five years from the date of the first call. Six months notice of the intention to purchase and redeem the shares is to be given to the holder, and then, on payment to the holder of the amount called up and paid in respect of such shares, the certificate is to be cancelled. The holder ceases to be entitled to dividend on the shares after the time fixed for the redemption, unless he has tendered his certificates and the company have failed to pay. Power is given to borrow £5000 in respect of the new capital, no portion to be raised by the issue of debenture stock. Fourteen-candle gas is to be supplied at a pressure of 7-10ths and one inch within the usual hours. The test burner is to be that prescribed by the Belfast Gas Act, 1865. The section of the company's Act of 1865 compelling them to maintain a testing-place is repealed, and, in place of the company, the Corporation of Belfast are to fit up and keep testing apparatus in working order; and, on giving three hours previous notice to the company, they may have the gas tested by some competent person, an officer of the company being at liberty to attend and watch the making of any such experiments. The penalty for any deficiency of illuminating power or for a quantity of sulphuretted hydrogen sufficient to discolour the usual test paper is not to exceed £10.

The *Brighton and Hove Gas Act* enables the gas company to charge for one year 4s. per 1000 in the parishes of Brighton and Hove; 4s. 6d. in the parishes of Portslade, Southwick, Kingston, and New Shoreham; and 5s. 6d. in any other parishes within the company's limits. The consent of the Board of Trade must be obtained for the continuance of these prices beyond the year, otherwise a reduction of 6d. per 1000 must be made; and while the above prices are charged, the company can only divide 5 per cent. This Act had passed before the Gas and Water Works Facilities Act Amendment Act was brought forward, but it contains a clause enabling the company to apply to the Board of Trade for a Provisional Order to further increase the price of gas or lower the illuminating power; and similarly local authorities may apply to the Board to order a reduction of price; 14-candle gas, tested by the No. 1 London Burner is to be supplied; but if the Corporation of Brighton make application, they may be supplied with 15-candle gas, paying an additional 3d. per 1000 for the luxury. The Act contains a clause giving the company power to sue for arrears at any time after the money becomes due, notwithstanding the provisions of any Act to the contrary.

The *Bristol United Gaslight Company's Act* empowers that company to raise £250,000 additional capital by the issue of new £10 shares, or stock; the shares to be sold by public auction in the city of Bristol after due advertisement, any premiums received being applicable to the general purposes of the company, but not entitled to dividend. [By the Act of 1853 the company were empowered to raise £80,000 in £10 shares, to be sold by auction; and the preamble states that the premiums received in respect of those shares amounted to £65,489.] Borrowing power to the usual extent is granted, and debenture stock may be issued. The money borrowed may be converted into preference or ordinary stock, with a maximum dividend of 5 per cent. After Jan. 30, 1874, gas is to be supplied at a pressure of 6-10ths and 8-10ths within the usual hours. It is not to contain more than 5 grains of ammonia, nor more than 30 grains of sulphur other than sulphuretted hydrogen, of which latter no trace is to be present. The referees ammonia apparatus and Dr. Letheby's sulphur test are to be used. The Corporation are to provide a testing-place at their offices; and whereas the said testing-place will be at the lowest level within the company's limits, and at a considerable distance from the works; the prescribed number of candles is only 13½. If, however, the said testing-place is removed or discontinued, the company are to provide one at the works, and the number of candles is then to be 14. The test burner is to be Sugg's London Argand No. 1, with chimney according to circumstances, and the photometer Letheby's open 60-inch, with all necessary adjuncts. The Act provides for the sale of some lands and the purchase of others, not exceeding 25 acres, for the purpose of manufacture and storeage.

The *Crystal Palace District Gas Act* recapitulates the existing capital of the district company, which consists of the original capital of £50,000, entitled to 10 per cent.; £50,000 preference, entitled to 6 per cent.; and £100,000 ordinary capital, entitled to a maximum of 7 per cent. This Act gives power to raise further capital to the amount of £150,000, entitled to 6 per cent. or 7 per cent., according as the shares issued are preference or ordinary. The usual borrowing powers in respect of the additional capital are granted, and the money borrowed may be converted into preference or ordinary stock, with a maximum dividend of 5 per cent. Debenture stock may be issued with a preferential dividend not exceeding 6 per cent. The Act incorporates the testing clauses of the Gas-Works Clauses Act, 1871. The illuminating power of the gas is to be 14 candles, the prescribed burner the London Argand No. 1, and the testing-place not less than 1000 yards from the works. The pressure is to be 6-10ths and 8-10ths within the usual hours.

The *Gosport Gas Act*, 1873, amends the Gosport Gas Act, 1865, by raising the maximum price for three years to 5s. 6d. per 1000. So long, however, as the charge exceeds 4s. 6d. (the maximum of the Act of 1865) the dividend payable is reduced to 5 per cent. While the charge remains over 4s. 6d., the local authority or ten consumers may apply to the Board of Trade to reduce the price. In case a reduction be ordered, the company may afterwards apply to the Board for a revision. In both cases, of course, an inquiry is to be made by some competent person appointed by the Board. The accumulated amount of the reserve-fund is limited by this Act to a sum equal to the dividends paid in the current or preceding year. Two special auditors are to be appointed, one by the local authority, and the other by the company. The gas is to have the illuminating power of 14 candles, tested by Sugg's London Argand No. 1, with chimney according to circumstances.

The *Leicester Gas Act* authorizes the Leicester Gas Company to raise additional capital to the amount of £100,000. The original capital of £50,700 is now to be called A capital, the £69,300 authorized by the Act of 1860 is to be designated B capital, and the additional raised under the powers of this Act will be distinguished as C. The dividend on this last is limited to 7 per cent. or 6 per cent., as the shares are ordinary or preference. Borrowing power to the usual extent is granted, and the company may issue debenture stock. Borrowed money converted into capital is only entitled to 5 per cent. Some further ordinary powers to manufacture fittings and utilize residuals are granted. Gas of 14-candle power, tested by Sugg's new London Argand, is to be supplied.

The *Lincoln Gas Act* enables the Lincoln Gas Company to raise further capital, and confers further powers. The position of this company is, we believe, unique. They obtained statutory powers in 1829, and until this year made no further application to Parliament. Their Act of 1829 fixed the capital at £8000, and allowed them to borrow £2000. Since then the company have expended on extensions and improvements £36,500 out of profits. This sum the present Act converts into improvement stock at 5 per cent., to be distributed rateably among the present shareholders. The additional capital authorized is £20,000, to be raised in £50 shares, which are first to be offered to holders of ordinary shares, and, if not accepted, to be offered by auction in the city of Lincoln in lots of not more than five. The reserved price in this case is not to be *more* than the nominal value. The dividend payable on these new shares is as usual limited to 7 or 6 per cent., according as they are ordinary or preference. This Act authorizes the borrowing of £20,000; but no part of this sum can be borrowed until the whole of the additional capital is subscribed and half paid up. Borrowed money can only be converted into ordinary or preference stock at 5 per cent. The prescribed number of candles is 14; the test burner, Sugg's London Argand No. 1; the testing-place is to be at or near the town-hall. The maximum price is 4s. 6d. per 1000 feet. The Corporation of Lincoln and the company are each to appoint an auditor, and the company is to make a map of the district, 2 feet to the mile, showing all details of mains, &c. The Act fixes the qualification of directors, and a scale of voting for shareholders.

The *Neath Gas Act* empowers the Neath New Gas Company to raise additional capital, and confers other powers. The present capital of the company consists of £10,000 in shares entitled to 10 per cent., here called A shares; and £6000 entitled to 7 per cent., called B shares. This Act authorizes the company to raise further £20,000, in shares designated C, and which will be entitled to 7 or 6 per cent., according as they are ordinary or preference. These shares must be offered for sale by public auction in the borough of Neath, after due advertisement, and a reserved price must not be less than the nominal amount of the share. If not sold at the auction, they may be offered to holders of ordinary shares at par. Premiums realized are to be applied to the purposes of the undertaking, and are not to be capital entitled to dividend. The usual borrowing powers are granted, and the company may issue debentures. Borrowed money may be converted into preference or ordinary stock at 5 per cent. This Act confers one power not usually granted to gas companies—it allows the formation of a contingency or renewal fund as well as of a reserve-fund. This contingency-fund may be applied for repairing, renewing works, &c.; but it may also be used for increasing the amount divisible as dividend in any one year; it is never to amount to more than 2 per cent. of the paid-up capital. The sum prescribed for the reserve-fund is £3600—*i.e.*, the usual 10 per cent. on the capital. The maximum price for the next 12 years is to be 5s. 6d., and afterwards 4s. 2d., subject to discounts if the directors think fit to allow them. The prescribed number of candles is 14; the prescribed burner an Argand, consuming 5 feet per hour. The Act provides for the sale of the undertaking to the Corporation, and the purchase by the Corporation on such terms as may be agreed upon or settled by arbitration.

The *Nottingham Gas Act* empowers the Nottingham Gaslight and Coke Company to raise additional capital to the amount of £400,000, in shares of the nominal value of £50 each. These shares are to be sold by auction after due advertisement, and any premium is to be

expended in improving or extending the works, and is not to be considered as capital entitled to dividend. Borrowing power to the usual extent (one-fourth of the additional capital) is granted under the customary restrictions. The company may also issue debenture stock. The money borrowed may be converted into preference or ordinary stock, with a maximum dividend of 5 per cent. Power is given to acquire additional land by agreement, not exceeding in the whole 50 acres. Gas is to be supplied at a pressure of 6-10ths from midnight to sunset, and 8-10ths from sunset to midnight.

The *Newcastle-upon-Tyne and Gateshead Gas Act* confers further powers on the Newcastle-upon-Tyne and Gateshead Gas Company. The capital of the company before the passing of this Act was £300,000, raised at different times, and subject to different rates of interest. By this Act the capital is made into £350,000 consolidated stock, which is to be allotted so as to give an equal dividend. The Act further authorizes £100,000 additional capital or new stock, which is to be offered by auction. The dividend on all stock is limited to 7 per cent. while the price of gas does not exceed 3s. 4d. within the boroughs, and to 5 per cent. so long as the charge is greater than that sum. The maximum prices fixed are 5s. 4d. within the boroughs for the next four years, and 3s. 4d. after the expiration of that time. Without the boroughs 1s. 8d. in addition may be charged. The Act allows discounts to large consumers and for prompt payment. The company are to erect all public lamps free of charge, and are to remove them, when required by the local authorities, at a charge of 15s. each. They are to cleanse and keep each lamp in repair for 2s. a year, and are to supply gas and light them for 1s. per week. Each lamp is to consume at least 5 feet per hour at a pressure of 1½ inch. These conditions, however, are not to be binding on the company if a competing company authorized by special Act should come into either borough. Each local authority may diminish the number of lamps to be lighted in the summer months to one-half. The prescribed number of candles is 14; the burner, the Argand prescribed by the company's Act of 1864. The testing-place is to be at the works of the company in each borough.

The *Scarborough Gas Act* extends the limits of the Scarborough Gas Company, and authorizes additional capital. At the passing of this Act the capital of the company consisted of £20,000 consolidated stock entitled to 10 per cent.; £30,000 consolidated stock entitled to 7½ per cent.; £12,657 ordinary stock limited to 7 per cent.; and £8683 preference stock limited to 5 per cent. This Act authorizes the company to raise £30,000 additional capital, the dividend on which is limited to 7 or 6 per cent., according as it is issued in ordinary or preference shares. The shares are to be sold by auction or by tender, after due advertisement, and money received as premiums is not entitled to dividend. Borrowing power to the usual extent, and on the usual condition, is granted. The Act authorizes the acquisition of land for the erection of works, and the company are to dispose of superfluous lands and works within ten years. Some ordinary powers for the manufacture, &c., of fittings and the utilization of residuals are granted. The gas is to have the illuminating power of 14 candles, tested by the new London burner, the maximum price remaining the same.

The *Sutton, Southcotes, and Drypool Gas Act*, 1867, *Amendment Act* relieves the company from a difficulty in the acquisition of a piece of land for the erection of manufacturing and storeage works, arising from the non-delivery of notices as required by the Act of 1867. The Gas-Works Clauses Act, 1871, is incorporated, and made to apply to the existing undertaking.

The Gaslight and Coke (Chartered) Company's Act authorizes the company to expend £150,000 in purchasing and maintaining collier ships, lighters, &c., for the purposes of their undertaking only. A separate account of the money so expended is to be kept, and while a higher price is charged for gas than that prescribed by the company's Act, 1868, the capital so employed is only entitled to a 7 per cent. dividend. A special clause amends the Act of 1868 by enacting that section 110 of that Act shall be read and construed as if the words, "The Metropolis Gas Act, 1860," were omitted therefrom.

The *Uxbridge Gas Act* extends the limits of the Uxbridge and Hillingdon Gas Consumers Company, and authorizes additional capital. The original capital of the company is £16,000, and they have borrowed £4000, of which £1700 has been converted into share capital. By this Act they are empowered to raise £30,000 additional capital, and to borrow to the usual extent under the usual conditions. The dividend on the new capital is limited to 7 or 6 per cent., according to the nature of the shares. The company may issue debenture stock. Gas of 14-candle power is prescribed, to be tested with Sugg's new London burner, or some other burner to be approved by the Board of Trade. Power is given to purchase certain lands and to use patent licences.

Six give Local Boards and Corporations power to purchase and maintain gas-works.

The *Atherton Local Board Act* authorizes the Atherton Local Board to purchase the undertaking of the Atherton Gas Company, Limited. The capital of the company is £4500, in £5 shares. They have borrowed £3400, and have other outstanding debts to the amount of £600. The consideration agreed to by the local board is £7200 in cash, or annuities of 8s. per annum for each share. The Board besides assumes the mortgage debt of the company, £4000. This Act gives the Board power to borrow £20,000 on mortgage of the gas-fund, with or without including the works, and with or without including the general district rate. A sinking-fund to pay off the money borrowed is to be commenced in 1876. Returns of the money set apart are to be made to the Local Government Board, and if the provisions of this Act are not strictly complied with, the central authority may interfere. The Board take the ordinary powers of a gas company. The gas is to have the illuminating power of 14 candles, tested by an Argand burner consuming 5 feet per hour. The maximum price is 6s. per 1000 cubic feet. No provisions are made as to application of gas-rates and surplus profits.

The *Ayr Burgh Act*, among other things, authorizes the Corporation to purchase the undertakings of the Ayr Gas Company and the Ayr and Newton Gas Consumers Company, subject to the approval of a majority of the ratepayers of the extended burgh, expressed at a public meeting duly convened. The consideration has not yet been agreed upon, at all events it is not revealed in this Act. In the event of the purchase being effected, the Corporation are to supply 20-candle gas at a maximum charge of 7s. per 1000 feet. In this Act it is provided that any surplus profits shall be applied in reduction of the price of gas.

The *Briton Ferry Local Board Act* authorizes the Board to acquire the undertaking of the Briton Ferry Gas and Coke Company, now leased to Mr. Evan Williams. The consideration is the payment of £5871 to the company, and £781 15s. to the lessee. The capital expended by the company is not stated in the Act. No maximum price for gas is fixed, but one section makes it lawful for the Board to make an agreement with any body or bodies corporate or person to supply gas to any church, chapel, shop, inn, tavern, dwelling-house, or any public or private buildings, on such terms as may be agreed upon between the Board and the other party. The gas-rates are applicable—1, to payment of expenses chargeable to revenue; 2, to payment of interest on mortgages; 3, to a sinking-fund; 4, to a depreciation; and 5, the balance may be employed in enlarging or improving the works or to general purposes. Power is given to borrow £10,000 for the purposes of the Act. Besides the funds above mentioned, the Board may form a reserve-fund for the purchase of the site of the gas-works. The quality of the gas, test burner, &c., &c., are to be those fixed by the Briton Ferry Gas Act, 1866.

The *Dewsbury and Batley Corporation Gas Act* authorizes the purchase of the undertaking of the Dewsbury and Batley Gas Company. The capital of the company consisted of £37,000, in £5 shares entitled to 10 per cent., and £93,000 in similar shares entitled to 7½ per cent. The gross sum to be paid by the Corporation, as consideration for the undertaking, is £266,875, calculated to give £12 10s. for each share entitled to 10 per cent., and £9 7s. 6d. for each 7½ per cent. share—that is, 25 years purchase of the maximum dividends. The transfer was to take place on June 30 last, when everything belonging to the company passed to the Corporations, less the sum required to pay the dividends for the previous half year, and £1000 to be distributed by the directors in gratuities to officers and servants who might lose their employment by the change. To carry out the Act the Corporation of Dewsbury are authorized to borrow £230,000, and the Batley Corporation £220,000. In each case a sinking-fund is to be commenced at the expiration of five years, by setting apart such a sum as will be required to pay off the money borrowed in 60 years. A contingency depreciation-fund is also to be formed. Any balance of profits may be carried to borough funds, and is applicable to public purposes. Gas of 14-candle illuminating power, tested by the new London burner, is to be supplied at a maximum rate of 4s. 6d. per 1000. The Corporation take all the powers usually granted to gas companies.

The *Dumbarton Corporation Gas-Works, &c., Act*, among other things, authorizes the Corporation to purchase the undertaking of the Dumbarton Gaslight, a non-statutory company. The consideration is 9 per cent. annuities, redeemable at 25 years purchase, the redemption to be effected by means of a sinking-fund. The Corporation may, however, purchase annuities at any time, and if the purchase be made by money raised, and not from the sinking-fund, they may reissue such annuities to any person on payment to the Corporation of a sum equal to 25 years purchase. Power is given to raise such money as may be required for the purchase of the annuities, and a further sum of £15,000; and, as usual in Scotland, they may take cash credit at a bank. Twenty-candle gas, tested by a union jet burner, is to be supplied at a maximum charge of 6s. per 1000 feet. Any balance of profit is applicable for public purposes. A guarantee-rate may be levied to make up any deficiency in funds to pay the annuitants.

The *Over Darwen Local Board Water-Works and Gas-Works Act* empowers the Board to purchase the undertaking of the Over Darwen Gaslight Company. The paid-up capital of the company consists of £36,000, raised by the issue of 2400 shares of £15 each, and £3200 raised by the creation of stock. The mortgage debt is £8050. In consideration of the undertaking being vested in the Board, the Board grants perpetual annuities of £1 2s. 6d. in respect of each share of £15, and annuities of 7½ per cent. on the stock. The mortgage debt of the company remains a first charge on the works and revenue. The annuities may be redeemed by agreement by means of a sinking-fund, formed by setting apart every year a sum equal to one-hundredth part of the capitalized value of the annuities at 20 years purchase. No provision is made for the formation of a depreciation-fund. Power is given to levy a gas-works rate not to exceed 1s. in the pound. The Board may borrow £80,000 for the purposes of the gas and water undertakings. Gas supplied is to have the illuminating power of 16 candles, tested by an Argand 15-hole burner, with 7-inch chimney, or other approved burner, consuming 5 feet per hour. The maximum price remains the same as fixed by the Gas Act, 1855, which is to be construed as one with this Act.

Four Acts confer further powers on local authorities in respect of gas undertakings previously acquired.

The *Barrow-in-Furness Corporation Act* empowers the Corporation to borrow £10,500, in addition to the £45,000 authorized by their Act of last year, to construct additional gas-works, and make a railway siding to connect the works with the Furness Railway.

The *Buxton Local Board Act* empowers the Board to borrow £10,000, or, with the sanction of the Local Government Board, £15,000, for the purchase of land and the erection of new gas-works. The Act fixes the maximum price of gas at 6s. per 1000 feet, and the quality at 14 candles. There are no other provisions of importance with respect to gas.

The *Glasgow Corporation Gas Act* authorizes the Corporation to convert the annuities now payable to former shareholders in the gas companies into consolidated stock, with interest at the rate of 4 per cent. Each person who is a holder of an annuity, when he has agreed to the conversion of his annuity into consolidated stock, will be entitled to receive from the Corporation or be credited by them with such a capital sum as will yield an annual return equal to the annuity or annuities to which he is on that day entitled. The conversion is optional on the part of the annuitant, and a saving clause protects the rights of those who object.

The *Stockton Gas Act* authorizes the Stockton Municipal Corporation to borrow, on the credit of their gas-works, gas-rents, and borough fund, £93,500, which is the estimated expenditure required to be made for gasholders, mains, and other permanent works within the next ten years.

Correspondence.

GAS PURIFICATION IN LONDON.

[After further mature consideration, we have come to the conclusion that there is no impropriety in allowing our correspondents to express their views on the questions raised by Mr. Patterson's pamphlet and patents, and we therefore give insertion to the following letters.—Ed. J. G. L.]

Sir,—For two reasons I desire once more to trespass on your columns on the above subject.

First, the question has again cropped up in your pages by the publication of a pamphlet by Mr. Patterson, a late referee; second, because that gentleman, in your last issue, has introduced my name by quoting a portion of what I stated in a discussion before the Gas Managers Association, and has drawn a conclusion, from what I said, that misrepresents me. Doubtless Mr. Patterson has done this unintentionally, and as he gives no address, I have not the means of having an explanation with him privately; however, I do not complain of this, as the thing may be done in your pages if Mr. Patterson will attend.

Immediately after Mr. Patterson made known his discoveries in the purification of gas from sulphur, I read a paper before the Gas Managers Association, and which was published in the Journal of July 2, 1872. I also wrote a letter on the same subject, which appeared in your issue of July 30, 1872, in which I showed that the process discovered by Mr. Patterson was precisely in effect what I and many gas engineers had long practised, only that our mode of carrying it out was in every way superior to that described by Mr. P.; but those communications, so far as I have noticed, have never been replied to by that gentleman.

I request his attention to them now. There can be no doubt that Mr. Patterson improved the purity of the gas at Beckton, as evidenced by the great diminution of sulphur in the gas subsequent to his instructions being carried out, and he deserves all credit for what he did; but I submit that if he had had a wider knowledge of what is done elsewhere, he would not have come to the conclusion that he was "breaking up new soil," when, as I believe, he had only discovered the road on which many practical gas-makers had been travelling for many years.

Mr. Patterson thinks that the greater affinity of lime to carbonic acid than to sulphuretted hydrogen was not known to gas-makers prior to his researches at Beckton. I can assure him that this is a mistake. It is 20 years ago since I had a conversation with Dr. Odling on this very point. I was using the wet lime process and running the "blue billy" into open tanks. The Doctor pointed out that the lime water charged with sulphur was absorbing carbonic acid from the atmosphere, and liberating sulphuretted hydrogen. It is also well known to many gas men that in making gas from wood, so much carbonic acid is formed that it is very difficult to get the gas free from sulphur.

I had occasion to try this seven years ago, and from my purifying surface being too small, had to abandon it, as I could not maintain the gas free from sulphuretted hydrogen, let alone the other compounds of sulphur; in fact, these things are so well known that those who do not know them are in a most rudimentary state indeed.

Mr. Patterson half admits that there was indeed a glimmer of knowledge on the subject, but the results, he alleges, were arrived at empirically. Well, if you are fighting with a man and knock him down, it matters little whether you do so empirically or by a skilfully adjusted force; and if gas managers found, by working a series of purifiers in the rotation of passing the gas through the foulest, and on to the cleanest last, that by doing so not only was their gas better, but less lime was used, and that the lime when taken out had much less smell—was much harder, in fact, in process of being converted into a carbonate—I contend they had knocked down their man, and whether empirically or designedly the result was the same.

I shall be sorry to misrepresent Mr. Patterson, and if I understand him rightly he uses two purifiers which are always the first to receive the gas; he charges them with lime, and passes the gas first through the foulest, and second through the less foul, and in these the gas gives off carbonic acid to the lime, and the lime in return gives off sulphuretted hydrogen to the gas, which passes on with it to what he would call the purifiers proper, and is there absorbed by more lime, and lastly by oxide of iron.

Now, what I desire to know is, in what does this differ chemically from working a series of purifiers in the rotation of the foulest first and the cleanest last; the foulest, whatever may be its position in the system, being the one that absorbs the carbonic acid?

Practically, however, the old system is the best. Indeed, Mr. Patterson's mode is that adopted in some works, where, the purifying surface being too small, a couple of purifiers are erected, and not wishing to be at the expense of making them part of a universal system, only sufficient pipes and valves are employed to make these two always the first to receive the gas, from whence it is passed on to the old purifiers, which have thus less work to do; but every gas manager who has had this to do knows that it is but a *dernier ressort*, and he is only too glad, when he can find opportunity and money to fix connexions so as to enable him to work the whole as one system.

In quoting me, Mr. Patterson writes: "At the meeting of the Gas Managers Association, he (Mr. A.) gave the following advice:—'If the lime is removed from dry lime purifiers the moment it gives a black test by acetate of lead paper, a great mistake is committed, because the lime will continue to do good in the purification of gas for a long time after it ceases to attract the whole of the sulphuretted hydrogen;'" to which he adds: "This was the prevalent idea among the best authorities—*it was thought that the longer the lime was kept in action after* $S H_2$ *passed forward the better.*"

Those words that I have put in italics I think rather over-stretch "what was thought." However, keeping the principle they enunciate in view, permit me to quote from the report of the referees what they recommend to be done: "It appears impracticable at present to entirely exclude carbonic acid from the purifiers; but the referees are of opinion that the detrimental action of this element might be lessened by adopting a new system in working the purifiers—namely, by keeping (say) the two first lime purifiers in each house in action, not merely until they become 'foul,' but until the carbonic acid has expelled the sulphuretted hydrogen, and taken its place."

Now, it appears to me that this is precisely what I advised in the quotation Mr. Patterson made from my remarks, and with which he found fault, while saying that it was "the prevalent idea among the best authorities;" and it is because it is so unsatisfactory, that different authorities should so seem to misunderstand each other, that I address you these lines, hoping to clear up the discrepancy.

In the valuable report of the referees, from which I have been quoting, there appears to me some curious haziness, which deserves clearing up.

Under the heading Remedies, one paragraph states: "From experiments which they (the referees) have made, they can state that lime in the form of sulphide of calcium (*i.e.*, saturated with sulphuretted hydrogen) is a perfectly adequate purifying agent for 'sulphur.'" Then in the next paragraph but one they write: "The problem to be solved is—How to take out all the carbonic acid from the gas without simultaneously taking out all the sulphuretted hydrogen, which latter element is needed to convert the contents of the purifiers into sulphide of calcium. And the essence of the difficulty consists in the fact that carbonic acid exists in the gas in very much larger proportion than sulphuretted hydrogen does, while there is no chemical substance which absorbs carbonic acid without also absorbing sulphuretted hydrogen."

Why, they have just said that sulphide of calcium (*i.e.*, lime that is already saturated with sulphuretted hydrogen) is the chemical substance that is an "adequate" agent to employ.

Mr. Patterson seems a gentleman who, had he been thrown upon a desert island—I do not mean the Isle of Dogs, or down Beckton vicinity, but anywhere else—would have found out the true way to purify gas; but in his discovery, as in the present instance, he would have been very likely to have stumbled on some of the best modes adopted by those who in other lands had not only studied but worked out the same problems as himself.

19, *Northumberland Street, Strand,*
London, Oct. 24, 1873. George Anderson.

P.S.—There are other curiosities in the referees report, which, with your permission, I would point out; but as they do not bear on the present question, they would better come in under a future communication.

Sir,—There is one point in Mr. Patterson's process of gas purification by means of soda, which I think none of your correspondents have alluded to, and which requires explanation.

If I understand rightly, Mr. Patterson proposes to remove the carbonic acid from crude gas by means of caustic soda or sulphide of sodium, in either case producing carbonate of soda as his spent product. This carbonate has then to be causticized to enable it to be used over again.

How is this to be accomplished? If by means of lime, where is the use of the soda? it would surely be simpler to remove the carbonic acid from the gas directly by means of lime, as in the ordinary process.

As I have been engaged, on the largest scale, both in purifying gas and causticizing soda, I can state that if this is his process, the saving in lime will barely amount to 10 per cent., and the loss of soda to about 5 per cent.

The result must, therefore, be a considerable increase in the expense of purification, and I think the nuisance would be greater than by the common dry lime process. Edmund R. Southby.

Laboratory, 36, Willes Road, Kentish Town,
London, Oct, 25, 1873.

Sir,—Mr. Patterson, in his pamphlet of August, 1873, at page 17, describes a process for removing sulphur impurities from coal gas by the use of lime only—passing the gas through four purifiers—and seems to take credit to himself as being the inventor of the process.

Without desiring to detract Mr. Patterson's ability, I would wish to point out that the process he describes is precisely what has been done at Dover for the past eight years, from the designs and under the instructions of my partner, Mr. George Anderson, of London; and I may add that we find the lime when taken from the purifiers has very little smell in it. In addition, however, to the process described by Mr. Patterson, we ventilate the purifier to be changed by means of an exhauster, driving air through the purifier into the retort flues a short time before lifting the purifier cover.

With respect to washers and scrubbers, we have, for the past eight years, removed carbonic acid, sulphuretted hydrogen, and ammonia just as Mr. Patterson describes. The gas enters the washer charged with ammoniacal liquor, and has to traverse it three times. The liquor when put into the washer is about 8-ounce liquor, and leaves the washer increased in strength from 12 to 18 ounces. The gas then passes to the scrubber, which is supplied with pure water at the rate of about 12 or 14 gallons of water per 10,000 cubic feet of gas passed through, and the water takes up from the gas an amount of ammonia which converts pure water into ammoniacal liquor of 6 to 8 ounces strength.

At page 19, Mr. Patterson states "that until after he had made known his new (?) process of employing lime in gas purification no testings for carbonic acid were ever made in connexion with the working of lime purifiers." I can only say that 15 or 16 years ago, under Mr. Anderson's directions, when we had to adopt the oxide of iron process at the old Dover Gas-Works, we kept two purifiers for lime only, and tested for carbonic acid by bubbling gas through lime water, and had small cocks fitted on the purifiers with flexible tubes for the gas to be tested in a bottle of lime water, which indicated whether the lime purifier needed change or not.

Probably Mr. Patterson's "new" process may have been invented by him 15 years ago; if not, he will excuse me for reminding him that he is under a misapprehension in claiming as his invention the very process Mr. Anderson adopted 15 years ago.

Dover Gas-Works, October, 1873. R. H. Jones.

Sir,—My attention has been called to the 21st of October number of your Journal, in which you refer to Mr. Mann's patent of Dec. 2, 1871, for using the sulphides of calcium and ammonium for purifying gas from bisulphide of carbon after its carbonic acid has been removed. Will you allow me to say that as far as ammonia is concerned this was not new, as I had proposed the same thing before in a patent dated April 25, 1868. By the plan there specified, a rough caustic ammonia is employed, which removes the *carbonic acid* and sulphuretted hydrogen from the gas in such a manner that there is always free sulphide of ammonium in the purifying liquor to act on the bisulphide of carbon, the removal of which from the gas was one of the principal objects of the said patent. That carbonic acid will displace sulphuretted hydrogen from these sulphides has been well known for many years, and that the carbonic acid should be removed, as a preliminary step in purification, is a doctrine I have preached at most of the London gas-works also for many years.

Chemical Works, Deptford, S.E., Oct. 31, 1873. F. C. Hills.

ILLUMINATING POWER OF GAS.

Sir,—I beg to call attention to the following extracts from papers read by Mr. Sugg and Mr. Wills, as they seem to me to contradict each other:—

Mr. Sugg, in the last number of the JOURNAL, page 917, says:

"Gas can only be of that illuminating power represented by the quantity of carbon and hydrogen it contains per cubic foot. Thus, simply the standard quantity of 5 cubic feet contains, roughly speaking, so many grains of carbon in various forms, diffused through a certain quantity of hydrogen and a little sulphur. These, brought into contact with the proper equivalent of oxygen necessary for their combustion, will evolve a certain amount of light, which can, under no circumstances, be increased, although it may be diminished, either wilfully or accidentally."

Mr. Wills, in a lecture delivered before the Society of Arts, and reported in your JOURNAL of June 3, page 508, says:

"If marsh gas [which, according to a table he gives, forms 35 to 40 per cent. of London gas], possessing, it will be remembered, only a small amount of luminosity, be decomposed, either by its passage through a heated tube, or by the electric spark, the carbon it contains will be deposited, while the amount of hydrogen set free will occupy double the volume of the original gas. Yet the flame of this nearly pure hydrogen will be found to possess a greater luminosity than the flame of the original marsh gas, although it has lost nearly the whole of its light-giving material, accounted for by the presence of a very small quantity of acetylene produced during the decomposition."

So that it is hardly correct to say, as Mr. Sugg says, that a given quantity of carbon in a given volume of hydrogen will produce so much light, and no more. It needs qualifying by a proviso to the effect that the carbon is in certain states of combination with the hydrogen, or a portion of it. TOBIAS CANIS.

Legal Intelligence.

LIVERPOOL POLICE COURT.—TUESDAY, OCT. 21.

(*Before Messrs.* C. T. BOWRING *and* H. B. HORNBY.)

The *Liverpool United Gaslight Company* were summoned for having, on the 15th inst., unlawfully refused and neglected to supply the gas required for the premises of James Griffiths, 129 and 131, Richmond Row, after application for that purpose had been duly made.

Mr. PIERCE appeared for the complainant; and Mr. SEGAR, barrister (instructed by Messrs. Garnett and Tarbet), for the defendants.

Mr. PIERCE, in opening the case, said the complainant had property in Richmond Row worth about £4000. and was keeper of a model lodging-house. There were no fewer than about 170 beds in his establishment, and their worships would at once see what a large amount of inconvenience would be imposed upon him if the gas were to be cut off from these premises. Complainant had been in business about 12 or 15 years, during which time he had been a consumer of gas. The company had had from complainant a deposit of £8 during all that time, which would, with interest, no doubt amount to the price of the gas the complainant would consume in a quarter. On the 7th inst. the complainant went to the defendant's office to pay his quarter's account, which had become due on the 17th of September, and he was then told that the company would require an additional £5 deposit, which would have made it altogether £13. He declined to pay the extra money, remarking that he paid his accounts regularly, and therefore did not see any reason why he should be called upon to deposit more. Disregarding this protest, the company on the 15th inst. cut off the gas in the complainant's premises without his knowledge, and only turned it on again the following day upon receipt of a letter from him (Mr. Pierce) threatening legal proceedings. Mr. Pierce then quoted the Act upon which he relied, the 11 & 12 Vict., c. 38, s. 49, which was as follows:—"And be it enacted, that upon the application of the owner or occupier of any building or premises within the limits of this Act, the company shall supply gas as may be required to such building or premises, and that although there may be rent in arrear for gas supplied to a former tenant of such building or premises; and if for the space of ten days after such application, and a deposit of a reasonable sum as hereinafter mentioned, if required, the company shall neglect to supply gas as required, they shall forfeit and pay a sum of £5, and the like sum for every day during which such neglect shall continue; provided that the company shall not be compelled to lay down mains where none exist, and provided that the company may, if they shall think fit, require a reasonable sum, according to the number and size of the lights required by such owner or occupier, to be deposited with them as a security for the payment of the gas-rent to become due to the company for the period for which such building or premises shall be required by such owner or occupier to be lighted." The company had had the ten days notice years ago, as was shown by the fact that they had supplied defendant with gas; and, having failed to continue the supply, they had rendered themselves liable to the penalty named in the Act.

Mr. SEGAR contended that the magistrates had no power to inflict penalties upon gas companies for stopping gas; and that the ten days notice had not been given to the defendants, as required by the Act.

Mr. BOWRING, after consulting with his brother magistrate, said the bench were of opinion that they had power under the Act to inflict a penalty upon the defendants.

Mr. ANDERTON (clerk to the magistrates) pointed out that there was an informality in the information, which, he thought, was fatal to the complainant's case. The gas company did not become liable for the penalty in question until after the expiration of the ten days from the date of the refusal to supply. That period had not yet elapsed, as the offence was said to have been committed on the 15th, and therefore the summons should not have been taken out until the 26th inst.

Mr. BOWRING said that as there was an informality in the information the case must be dismissed. He was clearly of opinion that the section of the Act quoted was binding on the gas company, and if the necessary ten days had elapsed before the summons had been taken out, the bench would have proceeded with the case.

Mr. PIERCE said he hardly thought that Mr. Segar, representing such a wealthy body as the gas company, would take a trifling objection like this.

Mr. SEGAR said this was not a trifling objection, but was part of his contention; and as the point had been decided in his favour, he would not waive it. Besides, gas was now being supplied, and was only cut off for one day.

Mr. PIERCE said there appeared to be no remedy against the company except by bringing an action for damages.

Mr. BOWRING said that Mr. Pierce had better take out a summons in the regular way.

Mr. PIERCE said that if he did he would be met by Mr. Segar on the other point.

The summons was accordingly dismissed.

WORSHIP STREET POLICE COURT.—TUESDAY, OCT. 21.

(*Before Mr.* HANNAY.)

Mr. *James S. Merrett*, landlord of the Brown Bear public-house, Worship Street, Finsbury, was summoned by the Independent Gas Company for a sum of £9 6s. 9d., due for gas supplied to him.

Mr. DOUGLAS STRAIGHT appeared for the gas company; and Mr. WRIGHT defended.

The summons was taken out under the 142nd section of the Railway Clauses Consolidation Act, incorporated in the Gas-Works Clauses Act, section 40, the claim being for gas supplied from the March quarter up to September 15th, when it was cut off, the claim amounting at that date to £9 6s. 9d. The defendant disputed the amount, and said that the company had charged him for 10,000 feet more than was supplied, and on that ground he had refused payment, having offered £4 6s., which was refused. He complained very greatly of the arbitrary proceedings on the part of the company in cutting off his gas without having the matter settled, and thereby causing him serious injury and annoyance in his business. The answer to this on the part of the company was that under the 21st section of the Metropolis Gas Act, 23 & 24 Vict., cap 125, the company were entitled to do so after notice if the account was not paid. It was also pointed out that the company were entitled to claim a deposit before supplying gas. In explanation of the disagreement as to the amount of gas supplied, it was admitted by the company that when the account for the quarter ending in June last was furnished, a mistake of 10,000 feet was made. This was the result of an error in the copying of the index from the previous quarter, and was not discovered until after the account had been left with the defendant. When found out, a corrected index paper was furnished the defendant, but he asserted the correctness of the one previously rendered.

Clerks from the company's office proved the mistake, and how it originated.

A long discussion ensued between the counsel on either side, Mr. HANNAY remarking that, whatever was proved for the defendant, he could not get rid of his liability. There was no doubt a little temper in the matter. The defendant appeared to have taken advantage of the first mistake, when it was evident how that error had arisen. He (Mr. Hannay) thought an order should be made for payment of the amount claimed, which included the 10,000 feet omitted by mistake.

Mr. STRAIGHT said that he was instructed to ask for costs; but this Mr. WRIGHT opposed, and said that his client had already suffered so much at the hands of the company that an action would be brought. The defendant denied having had any notice of the intended stoppage of supply.

Eventually an order for the payment of £9 6s. 9d. was made against the defendant, but each side was left to pay its own costs. The gas company, it was understood, would restore the supply at once.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

PADDINGTON VESTRY.

At the Meeting of this Vestry on Tuesday, Oct. 21—the Rev. JAMES MOORHOUSE in the chair,

The Gas and Water Committee presented the following report on the proposed supply of gas to the public lamps by meter:—

The vestry having, by resolutions of the 4th of February and the 4th of March last, expressed itself in favour of adopting the average meter system in respect of the public lamps and brackets in the parish, they, in obedience to the resolution of the vestry of the 16th ult., have sought and obtained information as to the cost of giving effect to the recommendations of the gas referees.

Your committee find, from extensive data collected by them as to the modes of measurement adopted in Nottingham and other towns, that the average meter system has invariably worked well, and that the same can be put into good working order at a cost not exceeding £5 5s. for every twelfth lamp. The number of meters required for the parish would be 150.

Your committee believe that the vestry, by taking upon itself the entire control of lighting the parish, including repairs and maintenance of columns, will effect a considerable saving in the lighting-rate; indeed, sufficiently large to be enabled at the end of the first year's operation to pay for the meters, &c., required to inaugurate the system.

Your committee beg to submit that even under the dry meter test, authorized by the Highway Committee (which engineers pronounce unreliable for external work), a lesser amount of gas has been registered than the quantity (5 feet per hour) agreed to be furnished by the company to the parish, as will be seen by a diagram to be presented to the vestry on Tuesday next.

Your committee have given very careful attention to the matters referred to them from time to time, and have every confidence that the system prescribed by the referees will accomplish what the vestry have so often desired—namely, the purchase of the gas by measurement in a convenient manner, and with justice both to the parish and the Imperial Gas Company—and with a view of introducing the average meter system as early as possible, your committee beg to submit for the approval of the vestry the following recommendations, viz.:—

1. That at the termination of the existing contract with the Imperial Gas Company, the gas supplied to the public lamps in the parish be measured by a meter to be attached to every twelfth lamp, the average consumption of the whole of the lamps to which meters are attached to be taken to represent the average consumption of each public lamp supplied, and that the instructions and recommendations contained in the notification of the gas referees be adopted as far as practicable in carrying out the abovementioned system.

2. That a letter be sent to the Imperial Gas Company, stating that the vestry will be happy to consider any observation they may wish to make with reference to the notification received from the metropolitan gas referees.

3. That the services of a competent gas engineer or surveyor well versed in the arrangement and working of the meter system be engaged (through public advertisement), and that the payment of such engineer or surveyor be regulated as under, viz:—A fixed sum for applying the meter system throughout the parish upon the basis of the report of the gas referees, such amount to include attendences upon the gas companies, &c., and a commission of 20 per cent. upon such amount as may be saved during the first year under the new system.

Mr. MILLER, the chairman of the committee, moved the adoption of the first recommendation of the report, and said he firmly believed that the adoption of the new system, though it would necessitate the employment of a new and separate staff of officers, would result in a saving of £1600 a year. The parish of St. Pancras had already obtained the consent of the gas company to the meter system being adopted, and he read a letter from the vestry clerk of that parish, stating that the meters would shortly come into use, and the vestry of St. Pancras felt greatly strengthened in the course they had taken by the action of the Paddington Vestry.

The motion having been seconded,

Mr. ROCHE objected to the report being further considered that day, as the committee had not complied with the instructions of the vestry to bring up an estimate of the cost which would be incurred by introducing the meter system. He expressed a firm conviction that the parish would lose instead of gain by the meter system, and he suggested that, at least, the matter should be tested by the use of a few meters before committing themselves to the system. He moved that the first proposition in the report be referred back to the committee for reconsideration.

Mr. ELLIS seconded the amendment.

A letter was read from the Imperial Meter Company on the terms upon which they would carry out the work necessary for adopting the meter system, and the whole subject was referred to the committee, to whom also was referred the letter.

MONTE VIDEO GAS COMPANY, LIMITED.—The directors of this company have issued a report, in which they speak of the satisfactory progress of the company up to the 30th of June. They state "that the increase in the private consumption of gas, and also in the number of public lamps in Monte Video, steadily continues. The dock, though not yet finished, is so far realizing the expectations held out to the shareholders. An interim dividend of 4 per cent. is now declared out of the net profits of the half year, being at the rate of 8 per cent. per annum, free of income-tax, thus realizing what was foreshadowed in the prospectus. The dividend will be payable on the 1st of November. The directors congratulate the shareholders on the future prospects of the company."

SKOINES'S IMPROVEMENTS IN THE MANUFACTURE OF GAS.

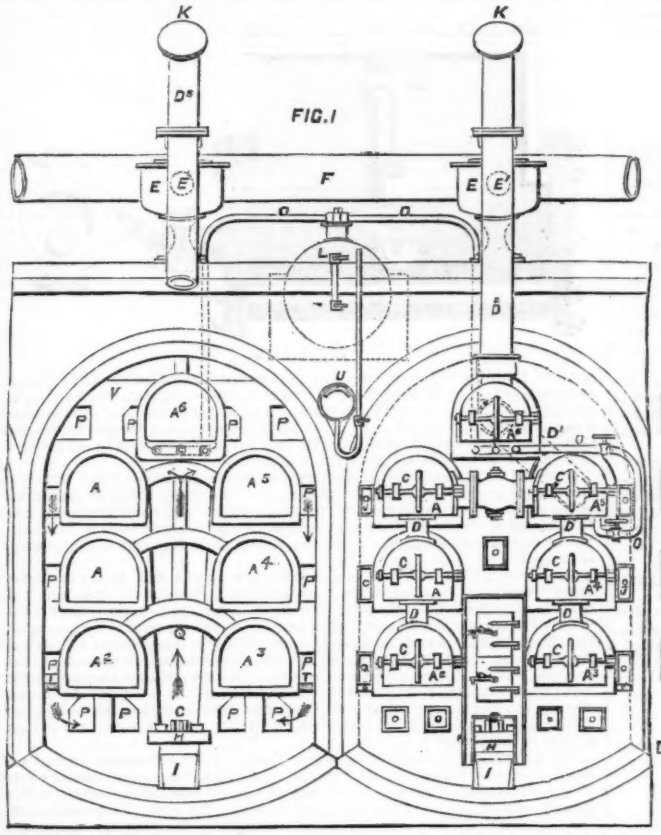
A large amount of interest has been excited amongst gas engineers and others respecting a patent taken out on the 8th of March last (No. 846), by Mr. Henry Skoines, of Argyle Street, King's Cross, London, for "*Improvements in the manufacture of gas, and in the combination of gases for the production of light and heat, and in the apparatus employed therein.*" A joint-stock company is in course of formation for the purpose of carrying out the invention. The following is an abstract of the specification, which was filed on the 8th of September last:—

This invention relates to certain improvements in the manufacture and treatment of gas, and the residues arising or resulting from such manufacture. It is principally directed to the manufacture of gas from cannel coal, carbon, chalk, limestone, bitumen, furnace slag, peat, wood, and paraffin, or other oleaginous substances; also water, steam, and air.

The object of the invention is to produce gas, whether for illuminating or for heating purposes, of better quality and more economically than has heretofore been usual. For this purpose cannel coal, peat, petroleum, or analogous gas-producing substances, is subjected in any suitable retort or retorts to the ordinary process of coking, or first carbonization; the sulphur and ammonia are removed, and certain resulting products heretofore treated as residues are converted into gas by causing the whole of the crude gases, vapours, or products, as they arise or issue from the coal or carbonaceous substance in the coking retort or chamber, to pass with superheated or other steam, or with water, into a separate retort or chamber charged with chalk or analogous material in a highly heated state, which highly heated chalk or analogous material will retain the sulphur and ammonia; the aqueous products, tar, and ammoniacal liquor deposited on the chalk or its substitute being taken up by and combined with the superheated or other steam, thus forming gases. The gases from this retort or chamber are caused to pass into another or "final" retort or chamber charged with coke or other suitable carbonaceous material in a highly heated state for amalgamating such gases and rendering them one homogeneous and permanent gas.

Three or more retorts, in a suitable setting, are used as usual, but instead of each retort being connected directly with the hydraulic main by a separate ascension-pipe, the retorts are connected together by special connexions in sets or series, in such manner that the several operations above mentioned may be performed systematically or in their turn, and the setting is so constructed that a portion of the heat from the retort furnace may if so desired be utilized for generating in a suitable generator, and when required superheating the necessary steam, which is conveyed through pipes into the intermediate retort, into which also the steam flows in close proximity to the products entering from the coking or first carbonizing retort. Sometimes air, water, or superheated or other steam, may be passed through the retort or chamber, containing highly heated chalk or analogous material or materials, and the resulting gases passed through the retort charged with highly heated coke or analogous substance, as aforesaid, and thence whilst in a highly heated state through the retort charged with cannel coal, bitumen, or other analogous substances, after which the gases may be passed through vessels or tanks containing tar, tallow, petroleum, or other suitable oleaginous substance, care being taken to exclude air from the tanks or vessels during the process.

Illuminating gas may be made by this process, dispensing with the use of the retort charged with the cannel coal, bitumen, or analogous substances, and passing the heated gases directly from the retort charged with coke or analogous material through the tanks or vessels containing the tar, tallow, petroleum, or other oleaginous substances.



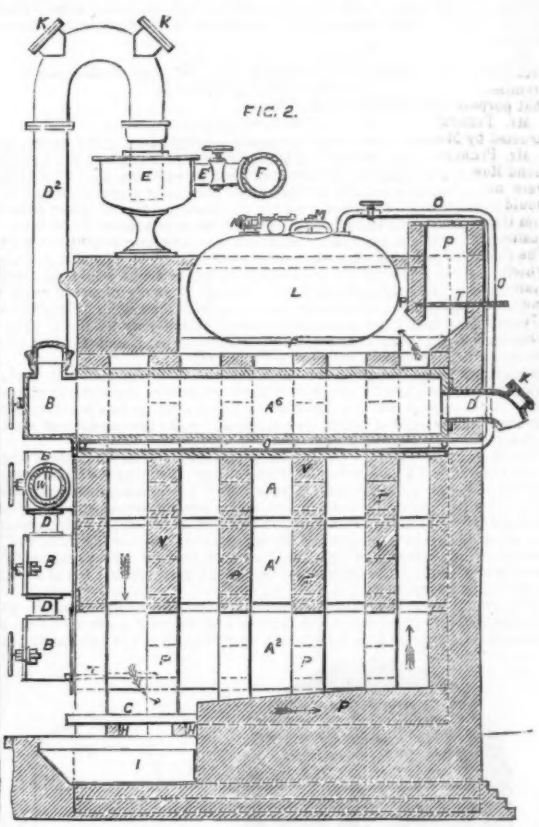


Fig. 1 shows, in front elevation, the plan of arranging the retorts when two benches or beds of 7 retorts each are placed side by side, one bench being shown with the front wall and retort mouthpieces removed, and the other bench being shown complete. Fig. 2 is a vertical section at right angles to Fig. 1, and taken in the line *a b* of that figure.

A, A^1, A^2, A^3, A^4, A^5, A^6 are retorts, which may be made of iron, clay, or other suitable materials, and set in the usual manner. They are provided with mouthpieces B furnished with lids, secured by ordinary crossbars C and screws. D are pipes between the mouthpieces connecting the retorts together. W is a valve which is opened when the whole of the seven retorts are worked, the retorts A, A^1, A^2, being shut off from the others when the valve is closed. The upper or final retort of each bench or bed is connected to the retorts beneath it by a pipe D^1; D^2 are the ascension-pipes from the upper or final retorts, and dip into the hydraulic sealing vessels E, which are connected by pipes E^1 to the gas-main F; but the pipes D^2 may, if preferred, be arranged to dip into a hydraulic main of the ordinary kind; G are the fire-bars, resting upon bearing-bars H, and having ash-pans I below them; L is a steam generator formed with a man-hole M, and provided with a safety-valve N, and steam-gauge U. From this generator to each bench or bed of retorts is a steam-pipe O, which after passing to and fro within the bed of the final retort A^6, terminates within the intermediate retort A^5. The flues P are arranged so that the products of combustion from either of the furnaces Q, after acting upon the retorts, may be brought into contact with the steam generator L, besides superheating the steam contained in the pipes O within the beds of the final retorts. The products from each furnace travel up between its two rows of retorts, striking against the under part of the final retort; thence they divide and descend on the outer sides of the retorts, after which they enter near the front a couple of flues which pass under the two lower retorts to the back of the setting, and which conduct the products to the back flue P^1, whence they travel in a horizontal direction around the lower part of the steam generator to the chimney, suitable dampers being used for regulating the draught, as will be readily understood. V are the blockings, J the sight-boxes, K the cleaning doors, and T are the dampers.

The retorts A, A^1, A^2, A^3, A^4, in the arrangement shown, are carbonizing or coking retorts, but to make the process clearly understood, let it be supposed that only the three retorts or chambers A^4, A^5, A^6 are in use. The retort A^4 is charged with cannel, or coal, or bitumen, or peat, wood, and paraffin, or with other analogous material, the crude gas, vapour, or rising products from which will pass up by the pipe or connexion D into the intermediate retort or chamber A^5, which is charged with chalk or analogous material, preferring chalk in small lumps, so as to present to the gas as much highly heated porous surface as practicable. This highly heated chalk or porous material will absorb the sulphur and ammonia, the aqueous products, tar, and ammoniacal liquor being taken up by the steam flowing in by the pipe O, or it may be by steam formed within the retort A^5 by introducing water into it. By this admixture of steam with the aqueous products, tar, and ammoniacal liquor, in the retort A^5, charged with highly heated chalk or analogous material, as aforesaid, gas is formed. From the retort or chamber A^5 the gases pass by the pipe D^1 to the upper or final retort or chamber A^6, containing coke, brick, ironstone, furnace slag, or analogous material or materials, which will render the gas homogeneous and permanent. From this final retort A^6 the gases may be conducted to the condenser, purifier, and holder in the usual way.

In some cases the process may be reversed; that is to say, instead of passing the products from the coking or carbonizing retort A^4 through the chalk or analogous substance in the retort A^5, air superheated or other steam or water are simply passed through the chalk or analogous material in the retort A^5, and through the coke or analogous substance in the retort A^6. The resulting gases may afterwards be caused to pass while in a highly heated state through the highly-heated retort A^4 charged with cannel coal or analogous material, and if it be desired to still further enrich the gas, it may be passed from the retort A^4 through tar, tallow, petroleum, or analogous oleaginous substances in suitable tanks or vessels.

In carrying out that part of the invention which has reference to the manufacture or production of illuminating gas from tar, tallow, petroleum, or analogous oleaginous substances, the gases produced by passing air, water, or superheated or other steam through the highly heated chalk or analogous substance, and thence through the final retort, as hereinbefore described, on leaving the final retort, instead of being conducted to a condenser, are caused to pass in their heated state through the tar, tallow, petroleum, or analogous material, which for this purpose may be placed within the hydraulic main, the gas-pipe dipping into them; or special tanks or vessels may be provided taking care to exclude atmospheric air.

The patentee states that he does not confine himself to the precise form or arrangement of the retorts shown in the drawing so long as the distinctive character of this part of the invention be retained; he also remarks that he is aware it has before been proposed in the manufacture or production of gas to employ superheated steam and to illuminate it by means of cannel or petroleum spirit, to which he lays no claim, nor does he claim the use of the several substances hereinbefore mentioned or referred to, except when the same are used in and for the purposes of this invention, which he declares to consist in—

1. Treating the crude gases, vapours, or products arising from the coking or first carbonization of cannel coal and analogous substances by introducing such products with superheated or other steam, or with water into retorts or chambers charged with chalk or analogous material in a highly heated state, as above described.

2. The amalgamating of the gases, as described, in retorts or chambers charged with coke or analogous substances in a highly heated state.

3. The above described process of manufacturing or producing gar for illuminating or heating purposes by coking or carbonizing cannel coal or analogous substances in coking retorts or chambers, treating the resulting gases, vapours, or rising products with superheated or other steam or with water in other or intermediate retorts or chambers containing chalk or analogous material for absorbing the sulphurous compounds and ammonia, and amalgamating the gases in final retorts or chambers charged with coke or analogous substance.

4. The arrangement of the apparatus with the retorts in connexion with each other, in the manner and for the purposes above specified.

5. The process of manufacturing or producing gas by passing air or superheated or other steam through a retort or chamber charged with highly heated chalk or analogous material, thence through a retort or chamber charged with highly heated coke or analogous substance, and afterwards through a highly heated retort charged with cannel coal or analogous substance, as above explained.

Lastly. The passing of the heated gases through tanks or vessels charged with tar, tallow, petroleum, or other oleaginous substances, substantially as described.

WEST OF SCOTLAND ASSOCIATION OF GAS MANAGERS.

(*Continued from page* 933.)

Mr. NELSON read the following paper on

GAS EXHAUSTION.

Amongst the many interesting matters connected with the manufacture of gas, the question of gas exhaustion, stands very prominent, but the *modus operandi* is varied according to the tastes or ideas of each manager, one believing in the rotary, and another in what is called the direct pumping action of the apparatus employed. Whichever way is adopted, the desired effect is to have the gas drawn off from the retorts as steadily as it is possible to be done, and, if practicable, without oscillation; also that the exhauster should be able to do the full duty of pumping, according to the calculation of its speed and area.

To discuss the utility of gas-exhausters in these times would be fruitless. Every engineer and manager will acknowledge their usefulness, though they may differ in opinion on the result and benefits; some estimating them at 10 and varying up to 20 per cent. respectively. Each may be right. The real difference will be found in the kind of exhauster used, and the size and arrangement of the works in which it is employed.

It may not be generally known that exhausters (even the best made) do not exhaust more than 75 per cent. of their calculated quantity at the speed given. The remarks made by Mr. Reid, of Edinburgh, on this point, in Clegg's "Treatise," are worthy of notice, and necessarily raise the question of why and wherefore.

Indeed, we are forced to believe that the difficulty is in dealing with an elastic substance like gas; for doubtless any of the rotary or pumping exhausters in good working order would pump the exact number of feet or gallons of water, according to the speed, water being a non-elastic substance.

It is evident that an exhauster working at a pressure of, say, 2 inches on the inlet, must discharge more gas per stroke than at zero on the inlet, and, say, 6 inches on the outlet, the difference between vacuum and compression. It therefore appears that the fault is not due to the machine, but to the substance with which it has to work.

With reference to the rotary exhauster, especially what is known as the eccentric rotary, where the diaphragm is ever varying at every point of its revolution (see diagram A), it is quite impossible the gas can be exhausted steadily,

Diagram A.

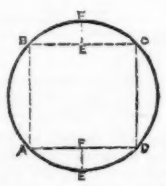


Diagram B.

because the work done by the diaphragm between the lines A A is about double that between B B, and three times that between C C.

The majority of engineers and managers acknowledge the direct pumping exhausters to be the best. Some of them, however, are of rather cumbrous construction; for example, those in use at the Liverpool Gas-Works, where three small holders working in water-tanks are operated upon by a shaft having three cranks in the circle. This keeps up a very steady pressure on the gauge, and proves that a single cylinder pumping exhauster cannot be steady in its action on account of the ever varying speed given to the piston by the crank motion. Thus if you describe the circle of the crank, and square it (see diagram B), it will be seen that nearly the whole of the work is done by the piston between the points A B and C D in each revolution, the time occupied by the crank passing between B and C being equal to that between A and B, while the piston of the exhauster can only have travelled the distance between E and F, thus showing the small amount of work that is done at two points with a single pump exhauster, and causing at the same time very unsteady action.

I have endeavoured to point out that a steady action cannot be kept up by a single cylinder exhauster of the form similar to that shown on diagram, on account of the ever varying speed of the piston. To overcome this difficulty, two pumping cylinders should be introduced to form one exhauster, each having their pistons working at quarter centre. Thus while one piston is on the dead centre, the other piston is doing full duty, and *vice versâ*. Both pistons being driven by a steam cylinder placed in the centre, it will be clearly seen that whatever position in the circle the cranks may be, the work is equal, and that is the object to be desired.

Another difficulty with the pumping exhauster has been the motion given to the slide-valve opening the ports by the eccentric. The piston commencing to travel of course commences to pull. At the same time the slide-valves are just beginning to open the ports, and very slowly. The gas, therefore, cannot get through the ports so fast as the piston is travelling, and this also causes a fluctuation of the gauge by the gas being kept back by the slide-valve. This great difficulty has been seen for a considerable time by some makers of exhausters, and their ingenuity has been drawn upon to overcome it. For some time it seemed to baffle their ingenuity, but it is now overcome in a beautiful manner by a simple arrangement, drawings of which I now beg to submit for your inspection (see diagrams C 1 and C 2). By this method the instant the piston begins

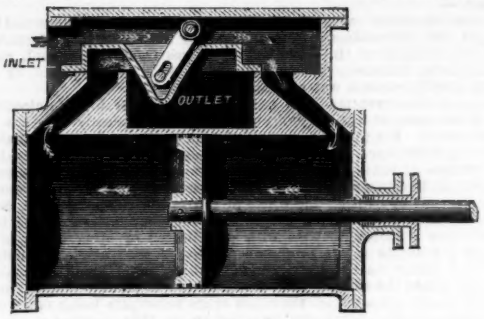


Diagram C 1.

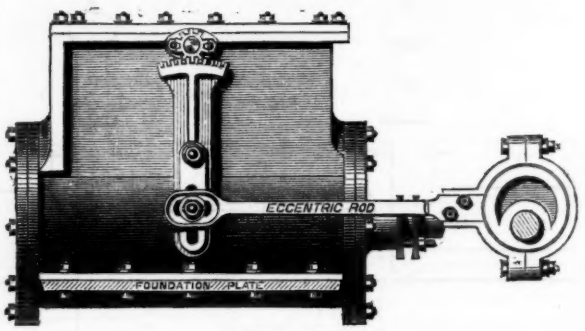


Diagram C 2.

to travel the valve is thrown open, and remains open the full stroke of the piston, and *vice versâ* on its return stroke. The gas, therefore, has full play to enter or exhaust, the ports being always fully open. The first of this kind of exhauster, of a capacity equal to 80,000 cubic feet per hour, was made for the Darlington Corporation Gas-Works. A number of eminent engineers met to see the new motion, and all felt exceedingly pleased with it.

It should be understood that even with all these precautions and improvements a perfect exhauster is not obtained, so far as the quantity is concerned, owing to the difference between the inlet and outlet pressures, because it may be said that no mechanical arrangement can ever overcome such a difficulty. Yet no mechanical arrangement should prevent the easy and steady passage of the gas.

As has been the case heretofore, this question should still be the subject of earnest study; and as managers have many opportunities of observing the motions of both gas and exhauster, they would do well to seek for improvement in that direction. Many capital ideas have been given to makers by managers, and it is in this direction makers must look for suggestions to produce improvement. The day has long since passed when managers bottled up their opinions, and considered their own ideas best. A happy change has taken place. The time for mutual interest and intercourse has arrived, of which the present meeting is an evidence. Let us trust still better days await those whose business it is to improve and turn to profitable account the materials committed to their charge in this branch of industry.

The PRESIDENT remarked that although most of the members had no exhausters in their works, they all admitted that exhaustion was preferable where it was practicable. Taking into account the saving effected in working with a greatly reduced dip, they must see that it repaid the cost. At present, however, apparatus for this purpose was only introduced between the condensers and the purifiers; but its application ought not to rest there. He had not heard any remarks as to the advisability of having exhausters at work between the various departments of purifying apparatus in gas-works; but it was his opinion that they should not only be used to exhaust the gas from the hydraulic main to relieve the retorts, but that there ought to be one placed between the purifiers and the station-meter and holders, to relieve the purifiers also of pressure, at least to such an extent as to leave only two or three inches at most on this part of the apparatus, whereby the material used in purifying would act more effectively, and in those large works more economically; thus having at no part of the works on the retort side of the exhauster next to the holders a pressure maintained exceeding three inches. He had seen large works where the exhauster was working with one inch of pressure on the hydraulic main side, and thirteen inches and upwards on the gauge on the purifier side—this being the ordinary pressure on the various apparatus in purifying with dry and wet lime purifiers.

A hearty vote of thanks was given to Mr. Nelson for his paper.

Mr. BLACK, (Kilpatrick) then described his arrangement for working the retorts without an hydraulic main, and showed the meeting by model the chamber on top of the ascension-pipe fitted with an hydraulic cup valve, having a stuffing-box and spindle with pulley, over which worked a chain connected to end of spindle and rod, attached to the mouthpiece with knotched fastening. So that by adjusting the rod the valve could be worked as a dip sealed in the chamber, or be entirely lifted, thus connecting the retorts direct with the condensers, &c., without any seal. The model showed how the rod had to be set so as to seal the cup ere the retort-lid could be removed.

The PRESIDENT said he did not approve of the idea of entirely superseding the hydraulic dip or seal on the ascension-pipes. Many plans had been explained in the JOURNAL OF GAS LIGHTING, both of British and American invention, for this object, but none of them appeared to him to be desirable. By one plan it was proposed to lift up and down each individual dip-pipe in the hydraulic main, and by another the main was divided in sections corresponding with the settings of retorts, so that by a system of pipes and cocks, and water supply, the liquor in the main was drawn off and refilled as the retorts were working or charging. But in all cases it seemed to him that these arrangements would act most injuriously when the greater part of the gas had been given off the coal, say in course of an hour, for then the gas would come back

from the other retorts working strong, and be burnt up in the retorts that are about off. But this was not the most grievous evil involved, for suppose any of the retorts in a bench had a crack or hole, the gas from the condensers, purifiers, or it might be from the holders, would have a direct communication with the chimney with no check; except, perhaps, where the individual retort had been ascertained, the putting of this valve or moveable dip into operation. The invention therefore is a decided mistake. No works should have anything but a dip-pipe, with as small a seal as possible; but still with a seal so that when the gas was off the retort it was kept safely stored up, but none comes back. There was another arrangement, by which a bent pipe was inserted in the side of dip; this also did good in reducing the seal. He was sure that ordinary mains, with a very small seal, were the safest, prettiest, and sweetest working arrangement yet adopted.

Mr. ROBB (Haddington) said he thought that many of the schemes brought forward in the JOURNAL OF GAS LIGHTING, and in meetings such as the present, were very clever and useful for their purpose, fitted for the peculiarities occurring in all works, which must be met as they were found. For instance, at his works he had an hydraulic main and a washer; between these there were the condensers and 80 feet of pipe. When he was not making gas, and the retorts were open, should a shower come on, and reduce the volume of the gas by cooling such a length of pipe, air bubbled in by the dips through the water in the hydraulic main. So far from the gas coming back into the retorts, he would like to prevent the air getting in. This was a peculiarity which he had not yet seen mentioned.

The PRESIDENT: Then your washer is what is termed a "bell washer," the gas being washed as it escapes round the rim?

Mr. ROBB: Yes.

The PRESIDENT: Do you still continue to work and approve of the washer?

Mr. ROBB said he did. There was a difficulty in getting the gas to go through the purifiers, but as soon as he used the washer there was no use for ashes on the first sieve, the gas went through fast enough and always quite dry. His washer is only four feet in diameter.

The PRESIDENT: The washer does effect this purpose, but, as I consider, at a very considerable sacrifice of gas and illuminating power; which by your adding the required amount of condensing power to your condensers, would by the saving, perhaps in a year or two, pay the improved condenser. It adds at least two inches more pressure on the retorts.

Mr. ROBB: The additional pressure at my works is just one inch.

Mr. M'LEOD (Glasgow) asked whether in Mr. Black's system a valve was required for each retort?

The PRESIDENT: Yes; which is an objection to every plan of the kind. It involves a ruinous expenditure of unprofitable capital, whereas an hydraulic main, with a well-adjusted regulator for the dips, would do for the whole.

Mr. BROWN (Crieff) asked whether the air entered Mr. Robb's pipes so frequently as to be a source of trouble to him.

Mr. ROBB answered that such was the case.

Mr. BROWN asked whether he had bonnets on the ascension-pipes?

Mr. ROBB: The removal of these would in no way alter the current of air into the pipes.

The PRESIDENT: Mr. Robb, you surely do not mean to infringe the Air Gas Company's rights? I have had handed me a prospectus of that company, but, owing to our limited time, I cannot enter to-day into any details of it.

Mr. ROBB said he had been questioned by his directors regarding this process, and had constructed a holder of one cubic foot capacity, with a saturator, with shelves of perforated zinc, on which he placed pieces of thick plaiding and broken sponge filled with petroleum spirit; the air went up one side of the saturating box through these shelves and down the other. At that time he was not prepared to say at what price illuminating gas could be made in this way, but he obtained a good light. He had since learned that such gas was better the more coal gas was mixed with it.

A vote of thanks was accorded Mr. Black for the description of his design.

The PRESIDENT moved a hearty vote of thanks to the directors of Anderson's University, for the use of the hall; also to Mr. Hay, of the North British Railway Company, which were carried unanimously.

Upwards of 50 members were present at the meeting.

At the conclusion of the business a vote of thanks was given to the president, and the members and friends proceeded by a special train, kindly arranged for the society's convenience by the North British Railway Company, to Maryhill, to visit the extensive new works erecting there, on the designs of Mr. Foulis, the gas engineer of the Corporation of Glasgow, by whose permission they were opened to the society that day. After very agreeably spending an hour in examining the works finished and in progress, and the many novel arrangements, introduced, whereby the working expenses will be materially decreased, the president, in the presence of the society, expressed to Mr. Foulis their hearty thanks for his kindness in allowing the inspection, as well as for his courtesy in accompanying them over the works.

Mr. FOULIS, in acknowledging the compliment, assured the members that he should be glad to see any of them, either together, as now, or individually, at any time.

The members then returned to Glasgow, and dined together in the "Caledonian Restaurant," Buchanan Street — Mr. A. Donaldson in the chair, Mr. Wm. Smith (vice-president) croupier, and a very enjoyable evening was spent.

DUNDEE (CORPORATION) GAS-WORKS.

The new gasholder, of which an account, extracted from the *Dundee Advertiser*, was given in the JOURNAL for July 29, has just been completed and filled, and the ceremony of turning on gas from it into the town took place on Saturday, the 18th ult., in the presence of the members of the Gas Commission, who afterwards lunched together—Bailie MAXWELL, in the absence of the Provost, occupying the chair.

The usual loyal toasts having been duly honoured,

The CHAIRMAN proposed—"The health of Mr. Walker and Mr. Macdonald, the contractors." In doing so, he said the gas-works had become a most important auxiliary to the successful trade of the town. Within a short period the consumption had enormously increased. He recollected the time when street "cruisies" were in use, while in dwelling-houses they were obliged to be content with the old "rashie" wick and oil. Since then they had made great progress. The gas-works had been carried on very energetically by the original companies, who did their very best, but it was considered that the town should connect itself somewhat more closely with the undertaking, and the result was that a bill was obtained for the purchase of both concerns. On his right and left that night were gentlemen who took a great part in the negotiations, and he considered that the bargain concluded was one very fair to both parties. Since then, the town had been able to supply cheaper gas—he would not say that it was better. It was found necessary some time ago to commence new and important additions to the works, and they had met that day to inaugurate the new gasholder. The contractors had been up to time, and the work was according to their ideas as perfect a bit of mechanical engineering as could be produced; and he was sure the Messrs. Walker could take to themselves credit for what they had done. The masonry work had been undertaken by Messrs. Macdonald, and he had no hesitation in saying that it was admirably done. He thought the commission might congratulate themselves in getting into contact with men who were anxious to do their duty to the public with credit to themselves and with economy to all concerned.

Mr. WALKER, in acknowledging the compliment, assured the commissioners that he had done his very best, and was gratified to find that the work had given satisfaction. The operations had been conducted from the beginning to the end without a single hitch, and no accident had occurred. He had gone over the specifications very carefully with Mr. M'Crae at the outset, as he considered this was most satisfactory. He never saw a man lost in a straight road, and if they could see a straight course at the outset they were not likely to go far wrong. He had been much struck by the practical man he had to deal with. He had had many engineers to deal with in his time, and it was always pleasing to meet with such men as Mr. M'Crae. Not a single pound of iron had been wasted in the contract. He had been over many works, but he never saw one laid out with more economy. He hoped that the trade of the town would increase, and that the consumption of gas would go on in a corresponding ratio, and that the result would be the speedy construction of even a larger gasholder than that which had just been completed.

Mr. KENNETH MACDONALD also returned thanks, and hoped the anticipations of Mr. Walker regarding another gasholder would be speedily realized.

Mr. WALKER then gave—"Prosperity to the town of Dundee," and—"The health of the Gas Commissioners."

Mr. JAMES LUKE proposed—"The health of the Provost of Dundee." He was gratified beyond measure to hear of the increasing consumption of gas, which was a sure index of the prosperity of the town, and he hoped it would long continue.

Mr. LENG said the clerk had asked him to propose a toast. It was the health of a gentleman who took a very active part in the transfer of the works of the two gas companies to the town of Dundee. Having been associated with him at the time in that effort, he must say that except for his indomitable firmness and energy it was doubtful whether the movement that was then undertaken to transfer the works would have been successful. He alluded to their junior Member of Parliament, Mr. Yeaman. In all movements of that kind one great advantage of the co-operation of Mr. Yeaman was that what he undertook he stuck to, and never wavered till he had carried his point.

Mr. YEAMAN, M.P., expressed the satisfaction which he felt at being present on that auspicious occasion. There was no one more zealous in desiring the transfer of the gas-works than he was, and he was glad to know that the transfer had turned out so successfully. Previous to it the inhabitants had to pay 5s. 4d. per 1000 feet, and shortly after it had been reduced to 4s., while the illuminating power was increased by 7 candles. Those who had been previously against, and those who were for the transfer, could now meet together and admit that a good work had been done for the town of Dundee. In the settlement a good bargain had been made by both the shareholders and the public. He concluded by proposing the health of Messrs. Thoms and Hean, the chairmen of the late companies.

Mr. THOMS responding, said he was one of three individuals who met together for the purpose of forming the Dundee Gaslight Company. That was 47 or 48 years ago. There was then a contest as to the material from which gas should be distilled, and he was deputed to go to other towns, and he did so, and brought up a report showing the superior advantages of coal over oil. He had therefore been at the birth, and he had also been at the interment of the gas company. Its course was a very prosperous one. He ought perhaps to except the last chapter. There were, however, many ingredients of comfort, and the chief of them was that both parties to the transfer were interested in the prosperity of Dundee. The extension of the works had been remarkable, At the time of the transfer the consumption of gas was somewhere about 200 million cubic feet, and last year the quantity had been 260 million. This had arisen from the increasing expansion of the town of Dundee, and he had no doubt that it would still further increase, and that the result would be an increase of the comfort of the inhabitants, which would be enjoyed not only by the present, but by generations yet to come.

Mr. HEAN followed, and congratulated the committee of management on the able way in which the works were laid out.

The health of the chairman (Bailie Maxwell) having been drunk, Mr. THOMS proposed—"The health of the manager, Mr. M'Crae."

Mr. M'CRAE, in reply, said he felt highly honoured in being taken notice of by Mr. Thoms, the chairman of the Old Gaslight Company, in whose service he had entered Dundee, and under whom he had acted with great comfort and pleasure. The engineer of a gas-work felt as much interest in the success of a work such as had been inaugurated that day as any contractor could, and he was personally grateful for the large attendance of commissioners. He corroborated every word which had been said by Mr. Walker. Both contractors executed the works not only up to but in one or two instances beyond the specifications. Not a cross word or letter had occurred during the execution of the works, both contractors being solicitous to do everything that was necessary, and he would be prepared to say that at the proper time in black and white.

Several other toasts were proposed and honoured before the close of the proceedings.

NOTTINGHAM GAS AND WATER COMPANIES.

PROPOSED PURCHASE OF THE UNDERTAKINGS BY THE CORPORATION.

A Special Meeting of the Nottingham Town Council was held on Thursday, Oct. 23—the MAYOR presiding—when the following report from the Corporation Gas and Water Committee was read:—

The Gas and Water Committee report that in pursuance of the powers conferred on them by the council on the 7th of April last, they have entered into negotiations with the gas and water companies respectively, for the transfer of their undertakings to the council.

Gas.—Your committee have offered to purchase the undertaking of the gas company on the following terms—viz., To pay to each shareholder in respect of every £50 paid-up share which he may hold in the company, a gross sum of £75; or, if such shareholder should prefer, to give him a bond securing the sum of £75 on the rates of the borough and on the corporate property, including the property of the gas company thus proposed to be acquired.

Water.—Your committee have also offered to purchase the undertaking of the water company on the following terms—viz., 1. To pay to each shareholder in respect of every £50 paid-up share which he may hold in the company, a gross sum of £75; or, if such shareholder should prefer, to give him a bond securing the sum of £75 on the rates of the borough and on the corporate property, including the property of the water company thus proposed to be acquired. 2. To pay up at once the whole of the arrears of interest due to each old shareholder in the company.

Gas and Water.—Your committee have also offered to introduce into Parliament such bills as may be necessary for carrying out the proposed arrangements, when the details have been formally agreed to.

The before-mentioned offers were forwarded to the companies by the town-clerk on the 7th inst. Your committee have not yet received any reply; but they deem it advisable that the town-clerk should be instructed to give the usual notices of the intention of the council to apply to Parliament during the ensuing session for bills for carrying out the above purposes, in order to comply with the Standing Orders of the Houses of Parliament. Your committee are aware that in making the above offers they have dealt very generously with the shareholders of both the gas and water companies. They were of opinion that it was desirable that the town should make a liberal offer to them, and an offer which should be a final one, and from its very nature should preclude any possibility of the shareholders of either undertaking complaining that they had not been dealt with in the most handsome manner. At the same time your committee feel that in view of the interests of the town, and for the purpose of avoiding all disputes in the future, and for many other reasons, they are perfectly justified in the course they have adopted.

The report was adopted, and it was resolved—"That the committee be requested to continue their negotiations, pursuant to the powers conferred on them, and that the town-clerk be requested to prepare notices for a bill for taking over the companies on the terms mentioned."

IMPROVEMENTS IN RETORT DRAWING AND CHARGING APPARATUS.

The apparatus described and illustrated below is the invention of Mr. William Mann, the engineer of the Blackfriars station of The Gaslight and Coke Company.

DRAWING-MACHINE.—(Fig. 1.)

According to this arrangement the rake is so placed within the frame of the machine that it can be raised or lowered by the hand-wheel, A, to the position vertically of any retort in the setting, and by causing the machine to travel from left to right, or right to left, it can also be brought to the situation of any retort in the range laterally. If, for example, the top retorts are to be the first to be drawn, the rake is, of course, set to their height, and the operation of drawing commenced. Immediately the first retort is drawn, the machine is moved to the next; and soon, until all the retorts at that level are discharged, the charging-machine following. Both machines are now made to travel back to the starting point, and during this interval the rake can be lowered to the next line of retorts, and more particular attention paid to the cooling of the heated parts, both of the drawing and the charging machines. And here it may be remarked that although the principle of the drawing-machine admits of the charge being drawn quickly at a *stroke*, and therefore the parts become less heated than when the operation is prolonged by the heaping up of the coke in front of the rake (so much dreaded because of the injury to the retorts), yet water to cool the parts will be necessary, the details for the application of which have been considered and arranged, although not shown in the drawing.

The rake is mounted on a small traveller, four wheels of which run on the upper surface of the rails, and two underneath to prevent tilting. The traveller also carries a cylinder containing a strong spring and piston, the rod of which passes through both ends. The forward end is keyed to a rod extended through the rake-arm to the head or "hoe," B; the rear end of the piston-rod is for com-

FIG. 1

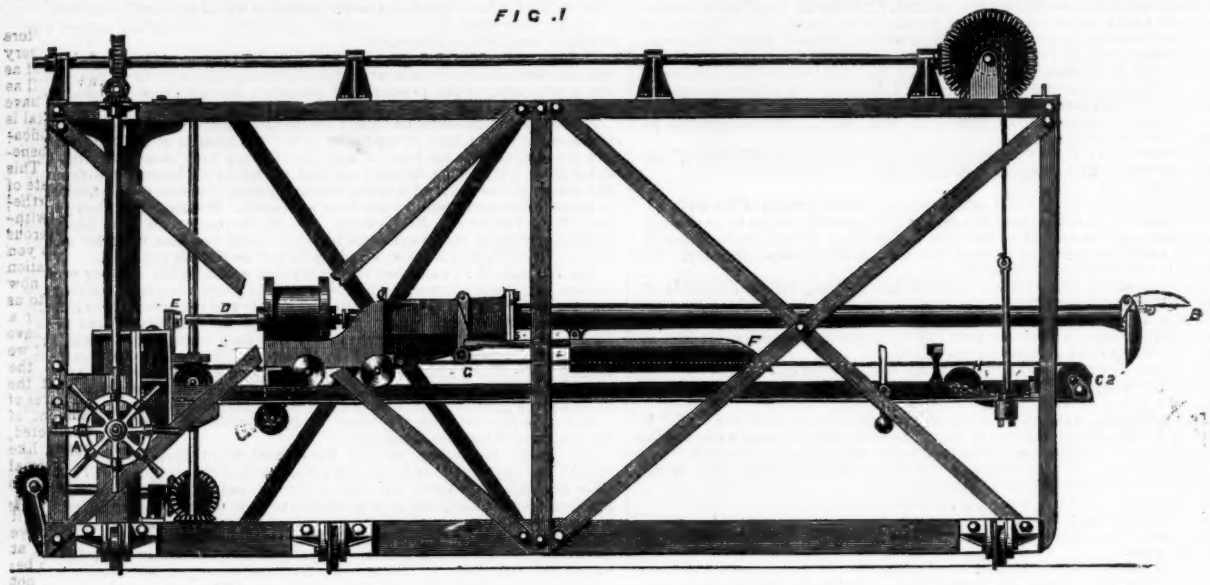


FIG. 2.

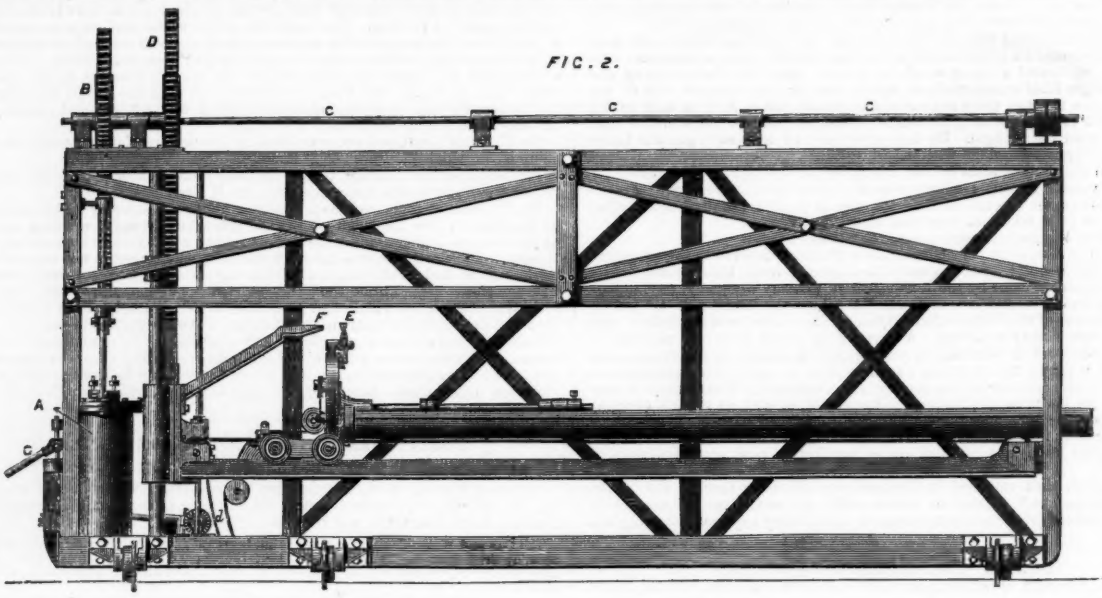


FIG 3

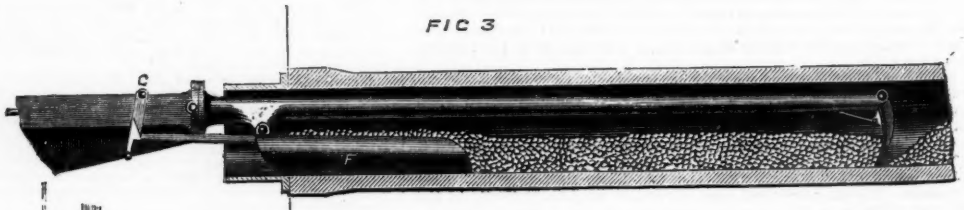
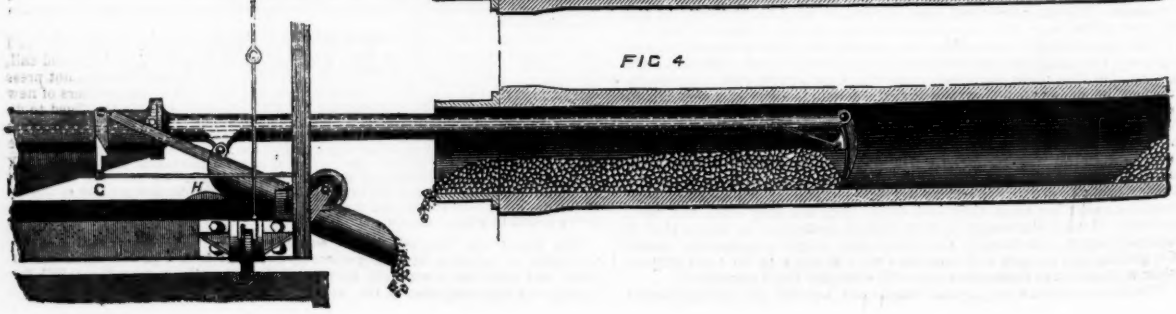


FIG 4



pressing the spring in the cylinder, and pushing the hoe out horizontally, the position required before entering the next retort to be drawn as shown in dotted line.

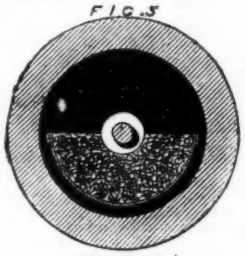
The to-and-fro motion of the rake is brought about by attaching the traveller on either side to an endless wire-rope or chain passing round pulleys, C^1, driven by the engine, and C^2, running loosely on studs. The position of the parts are shown at the period when the rake has nearly completed its back stroke. In another moment the end of the piston-rod, D, will butt against the block, E, and the rod will be driven inwards, causing the spring in the cylinder to be compressed, and as the rod continues through the rake-arm to the hoe it will at the same time cause it to be set out horizontally (as shown in dotted lines), and ready for entering the next retort.

Before the rake is inserted to the extent necessary to get hold of half of the through charge, whatever the length of that charge may be, the scoop-shaped implement, F, will have just entered the mouthpiece in the horizontal position now seen (Fig. 1); but at this moment the catch, G, is knocked back, and the scoop drops on to the mouthpiece slightly inclined (Fig. 3.), so as to have a tendency to plough under the fore end of the charge. The full in-stroke being completed the compressed spring in the cylinder is liberated, and by its power the rake is drawn down into the charge as shown in the drawing. Everything is now ready for the out-stroke; the gear, therefore, is reversed, and the coke is withdrawn with such ease that, compared with some arrangements which have been tried, it may almost be said to flow out.* The coke in the scoop or shovel on leaving the mouthpiece is deposited as shown (Fig. 4) into the coke-hole. The rake, continuing its backward motion, is drawn into the frame, by which the scoop is raised to its horizontal position again by the piece H, and retained there by the catch, G. The spring is then compressed, and the rake made ready for the next mouthpiece.

Charging-Machine.—(Fig. 2.)

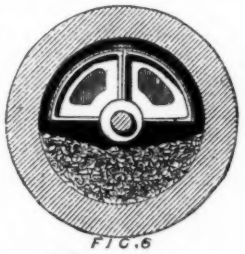
The scoop in this machine (Fig. 5) was designed for the ordinary 14 and 15-inch retorts at the City of London works. It does not turn over, but opens along the line of its bottom, and deposits the charge as shown at Fig. 6. The advantage claimed for this machine is that the scoop can be lowered to any convenient point for filling it with coal, and then readily elevated to the height of any retort in the setting that is above the bottoms, thus:—Steam is admitted to the cylinder, A, and the piston raised thereby; the piston rack, B, causes the shaft, CCC, to revolve and elevate the inner or rear end of the scoop by the wheel on the shaft, CC, gearing in the rack, D, while the outer end of the scoop goes up at the same rate by the winding of a wire rope or chain on to a drum keyed to the end of the shaft. When the filled scoop has been raised to the height for inserting a charge, the traveller carrying it is made to advance by similar means to those adopted with the rake, until a small chain, the slack of which is seen at D, becomes tight, and causes the scoop to fly open and deposit the charge in the retort (Fig. 6). In that position it is held by a double catch, E, until withdrawn and returned into the frame of the machine, and the levers of the double catch brought in contact with the tongue, F, which immediately releases the two halves of the scoop; they fall together, and the scoop is again formed.

FIG. 5



SCOOP CHARGED.

FIG. 6



SCOOP DISCHARGED.

A few words to explain the method employed for raising and lowering the scoop may be necessary. Every one will see at once that if this cannot be done expeditiously, the attendant would be overtaxed, and the whole process involved in a great amount of niggling and uncertainty. A little attention to the following remarks will explain the arrangement employed. The steam cylinder, A, has a cover and stuffing-box, but has no steam port to the top side of the piston. The up-stroke of the slide, worked by the lever, G, admits steam to the under side of the piston, and the down-stroke of the slide exhausts the same. When the scoop is at the point for filling with coals, the piston is down, and the cylinder above the piston filled with air through two orifices in the cover, one of which is small and the other of larger diameter. The latter has a valve opening inward, but which can be closed readily from without. By an easy adjustment this valve can be closed at any point of the up-stroke, and this is done just before the scoop has reached the stop which regulates it to the height of the retorts to be charged, and the remainder of the air then oozes out of the small orifice, and lands the scoop at the right point without concussion or anxious care on the part of the attendant. The cushioning arrangement mentioned above is simple, but cannot be explained more fully without detail drawings.†

CONTINENTAL UNION GAS COMPANY, LIMITED.

The Half-Yearly General Meeting of this Company was held at the City Terminus Hotel, London, on Monday, Oct. 27—Walter Thomas Fawcett, Esq., in the chair.

The Secretary (Mr. R. J. Fennessy) read the notice convening the meeting, and the following report of the directors, with the statement of accounts for the half year:—

Your directors have the pleasure of laying before you the accounts for the twelve months ending the 30th of June last.

The increase in the sale of gas has been considerable during the past year, but, owing to the high price of coal ruling throughout the winter and spring, coupled with the continued unfavourable Italian exchange, there has been no corresponding advantage to the profit and loss account. On the other hand, the price of English gas coals for some time past has been and still is steadily falling, and freights to the Mediterranean are now also below the average.

A considerable amount of new work for extensions has been carried out.

At Milan the new 120-feet tank has been completed, and the holder is proposed to be placed there next year. Large extensions have been made to the purifying capacities of the works, to provide for the great increase of consumption in this city. The station purchased of the Lombardo-Venetian Company has been put into a proper working state. This purchase, announced to you in April last, has now been completed, and a largely increased area of lighting has consequently been undertaken by this company.

At Genoa also a new 120-feet tank is in progress, and approaching completion. A new retort-house has been added, together with additional purifiers, condensers, and coal stores.

At Strasburg the purifying and condensing power has been increased. The results from this station continue to improve, and afford great hopes of future prosperity.

At Nismes a new telescopic gasholder has been erected to work in a tank previously constructed, and considerable improvements have been carried out in the distribution of gas.

At Alessandria and Montargis new tanks of small size have been constructed, and, as at Milan and Genoa, holders will have to be put in next year.

At the other stations nothing of any material importance has been done.

The director retiring by rotation is W. White, Esq., who, being eligible, offers himself for re-election. The retiring auditors are Joseph Hadland, Esq., and Frederick Tendron, Esq., who, being eligible, offer themselves for re-election.

The available balance of the year's profit and loss account, after providing for sinking-fund, is £51,559 19s. 10d. Out of this sum you have already received an interim dividend at the rate of 6 per cent. per annum on the ordinary shares, and at 7 per cent. per annum on the preference shares, for the six months ending Dec. 31 last.

Your directors have further resolved to declare a dividend at the rate of 7 per cent. per annum on the ordinary share capital for the six months ending June 30 last, free of income-tax, and for the same period on the preference shares at the rate of 7 per cent. per annum, leaving £8948 18s. 5d. to be carried forward to next account.

The dividends will be paid as usual on the 4th of November.

The Chairman: Gentlemen, it is my duty to move—"That the directors report and the statement of accounts be received and adopted." I have very little to state on this occasion, as we have endeavoured to make the report as explanatory as it is possible to do. The statement of accounts is also as full as it can be made. You will learn from it the very gratifying fact that we have had a large accession of business during the year, and that our total rental is now something very considerable. Of course it is a drawback to our gratification to know that notwithstanding this increase there has not been that beneficial effect upon our profit and loss account that we could have desired. This is attributable solely to the high price of coal, and to the unfavourable rate of exchange, which has ruled very badly for us during the past year. Nevertheless, it will be only fair to state that in the opinion of the directors, notwithstanding these unfortunate circumstances, the company is in a most prosperous condition, and it affords them great satisfaction to be able to present to you such a report as that which has just been read. There is one consideration which is exceedingly pleasing to them, and that is that at the time I am now speaking the market value of the article which is of more importance to us than anything else—I mean English gas coals—is lower than it has been for a long time, and appears to them to be steadily going downwards. We have received within the last few days several offers which—from the fact that we have good stocks in hand—we have not been able to accept to the extent we should otherwise have done. Moreover, we anticipate that the market will be lower still, so that we are not in any hurry to avail ourselves of present prices. No doubt this is very satisfactory, because, as the amount of our revenue is so largely increasing from the improvements we have effected, and from the extensions of business which naturally attend a company like this, it is evident that, should coals again reach something like their normal price, your dividends will be materially improved. We have made considerable outlays of capital, and are still expending large sums in extensions of works, which will soon begin to have an effect upon our operations; so that, even if coals should not recede in price, as we now confidently expect they will do, we still hope to do something in respect to dividends more satisfactory than at present. It is not an easy thing to prognosticate what is or what is not to be; and it is not a pleasant thing, having prognosticated, to find results are not precisely so favourable as one has foretold they would prove; I shall, therefore, not attempt anything of the kind to-day, but merely repeat what I have said—that we are of opinion coals will be much lower in price, and that we have great hopes, though not, perhaps, "great expectations," that the condition of things in Italy may lead to a more favourable state of exchange. With regard to the large works we have in progress, it may be well to mention that we shall be under the necessity shortly to make a call upon the holders of new shares. We cannot incur these large outlays, and keep up the credit of the company, without additions to our capital, and, therefore, as I say, we shall soon make a call upon you. I do not know that there is any other matter upon which I need touch in reference to the working of the company; but before I sit down, I may make the announcement to you that our secretary (Mr. Fennessy), who has been with us a great number of years, has resigned his office, having undertaken other duties which will be very profitable to him, and which will afford him excellent opportunities for the exercise of his great powers as a linguist. He will, therefore, not be with us at our next meeting, but we have made a provisional arrangement, which in all probability will result in our permanently electing a gentleman to the office of secretary who, having been engaged in the operations of the company for nearly ten years, possesses a considerable knowledge and experience of our affairs. We have reason to believe that this appointment will be a satisfactory one, and I am sure that while we all join in wishing Mr. Fennessy a good voyage and success in the new duties he has undertaken, we shall give a cordial welcome to his successor, and render him all the assistance in our power. I now move the adoption of the report and accounts.

Mr. White seconded the motion.

A Shareholder: Is there any reason why the accounts should not be printed and in the hands of shareholders before the meeting? We could then come here prepared to discuss them; as it is we find it quite impossible to follow them from the mere reading of them by the secretary.

Mr. Blanford: I rise to say that I hope the directors will not think of publishing them. I believe it would be very mischievous. There is no foreign gas company which publish their accounts.

Mr. F. E. Smith (of Sheffield): I was at one time an advocate for the publication of the accounts, but I am satisfied, by the explanations which were given in answer to my request that it should be done, that it would not be following a prudent course. Any shareholder who happens to be in London can go to the office and look over the accounts, and I know that the secretary will furnish him with every information respecting them. At the present time, when we are paying only 6½ per cent. per annum, there is nothing to excite the jealousy of foreigners; but if in future years our prosperity should increase, and we are able, as I hope we shall be, to pay 10 per cent. or even more, this might be the result, and the publication of our accounts would only tend perhaps to strengthen opposition against us. In the case of gas companies in England, the Legislature has limited their dividends to 10 per cent., but there is no such limitation in foreign undertakings, and I think, after the long forbearance of shareholders in this company, who for some years had but small dividends, we may reasonably expect that, with a reduction in the cost of coal, and the further development of our works, we may hereafter get a much higher rate. I do trust, therefore, the shareholders will not press the board to publish the accounts. And before I conclude, I may just express the hope that, in reference to the proposed call, the directors will, with a due regard to the interests of the company, not press too heavily upon the shareholders. Many persons who are large holders of new shares, and do not wish to reduce their holdings, will, I fear, be obliged to do so if a call of, say, £2 10s. per share were made at once, so that if the directors could consistently make a call upon the 1860 shares now, and a call upon the 1872 shares three months hence, I think it might be a great convenience. I may add that I think the present report very satisfactory, and the dividend proposed is certainly larger than I had expected, considering that many English companies have not only had to go to their reserve-funds to maintain their dividends, but have been also compelled to raise the price of gas. It seems to me that the directors of this company must have bestowed great care and attention upon our affairs under the trying circumstances of the past years to be enabled to present us to-day with such favourable results.

The Chairman: With regard to the call, I may say that the directors will consult the convenience of the shareholders, so far as they can do so with a

* Experiments have been made on such a scale as to justify this statement.

† By slightly modifying the scoop described in Mr. Rowland's invention of retort-charging machinery (see Journal, Aug. 26, page 764), as to the opening for receiving the coal and returning the sliding bottom by the vacuum arrangement, claimed by Mr. Mann in the specification of his stoking machinery (see Journal, Sept. 9, page 811), instead of by rack and pinion, the single-scoop machine would work D-shaped retorts.

strict regard to the proper position and credit of the company. We have undertaken very large works, and it is only proper that we should put ourselves in a position to pay for them, and to carry on the concern in a creditable way. We do not propose to press you unduly, but I may remark that when the new shares were created there must have been an undoubted belief that some day or other they would be called up. And there is another point in reference to the capital, and why it is necessary that we should have plenty of it—viz., that we have to keep up very large stocks, and the increase in the price of coal and iron makes the capital required for this purpose much larger than under ordinary circumstances. It will not be long before we make a call, and I scarcely think the amount we shall call up will be so large as to make any one uncomfortable, or that we shall be under the necessity to press unduly for it.

A SHAREHOLDER: A great many shareholders would, I believe, pay up their shares in full if you hold out to them an inducement to do so. You would then have to make a smaller call.

The CHAIRMAN: There is a great deal in what the last shareholder says, and we will take the matter into consideration. We have frequently had applications to be allowed to pay calls in advance, and we will not lose sight of the suggestion.

The motion was then put and carried.

The CHAIRMAN proposed the re-election of Mr. W. White the retiring director. Mr. White, he said, had been a director of the company from the time of its establishment, and was a most active and useful member of the board. He was chairman of the European Gas Company, one of the most successful foreign undertakings, and his knowledge and experience of gas matters were of great value.

Mr. HARRIS seconded the motion, which was put, and carried unanimously.

Mr. WHITE acknowledged the vote, and said that it was a great honour and pleasure to him to have been re-elected after having served the company for many years. It must not, however, be supposed that the office of a director of a gas company at the present time was free from anxiety. During the past year the coal question was one which required great care, and the board of this company had given to it the most unremitting attention. By closely watching the markets they had been able to make purchases in many cases, he believed, to a greater advantage than some other companies. This undertaking, in his opinion, had a great future before it, and he only hoped his life might be spared to see it.

On the motion of the CHAIRMAN, seconded by Mr. BLANFORD, the retiring auditors, Messrs. Hadland and Tendron, were re-elected.

Mr. TENDRON returned thanks for himself and colleague. He said: For myself, as this is the first time that I have been formally elected by the meeting, I think I ought to acknowledge the confidence which you are pleased to repose in me. As the accounts of the company are not published, it is the more important that a thorough investigation should be made of them by your auditors. I assure you that I and my colleague have devoted much time and pains in looking through them. Not only have we carefully examined the statements laid before you to-day, but all the various items of expenditure. The books in London contain duplicates of the accounts at all the stations, the whole of which have been gone through carefully by us. I believe the accounts presented here are fully to be relied upon, and that the dividends you will receive have been fairly earned.

Mr. BLANFORD moved a vote of thanks to the directors, who, he believed, had the interests of the company most sincerely at heart, and laboured hard to produce the best results for the proprietors.

Mr. STOKES seconded the motion, which was heartily responded to.

The CHAIRMAN: Gentlemen, I assure you this vote is very gratifying to us. Mr. White has only stated that which is the simple fact, and if no credit is due to us for it, I think it right that we should be able to say we do all work together conscientiously and zealously, with a determination to make the company successful. For my own part, though I am not a particularly sanguine man, I am looking forward to a great future for this concern, and I feel persuaded it will not be a very long time after coals have come down to something like a reasonable price, before the seed that we have sown becomes productive. On the part of the directors and for myself, I thank you very cordially for the vote which you have just passed.

Mr. HARRIS said he thought, as this was the last meeting at which Mr. Fennessy would be present, the shareholders ought not to separate without presenting to him a hearty vote of thanks for the services he had rendered the company as their secretary. He had much pleasure in proposing it.

The motion was seconded, and carried by acclamation.

Mr. FENNESSY appropriately acknowledged the vote, and the proceedings then terminated.

SINGAPORE GAS COMPANY, LIMITED.

An Extraordinary General Meeting of this Company was held at the London Tavern, Bishopsgate Street, on Tuesday, Oct. 21, to receive the report of the directors and the balance-sheet and accounts for the half year ending June 30, and to declare a dividend—H. P. STEPHENSON, Esq., in the chair.

The SECRETARY (Mr. R. King) read the notice convening the meeting and the minutes of the last half-yearly meeting. The following report and statements of account were taken as read:—

The directors have the satisfaction of reporting continued progress in the lighting of Singapore, for particulars of which they refer to the report annexed, from their engineer and manager, Mr. E. J. Wells, dated Sept. 6, 1873.

There has been considerable increase in the cost of coal, iron, and other materials during the half year, and the cost of freight has also risen.

The balance-sheet to June 30, 1873, and appended to this report, shows the financial position of the company. The directors have written off for depreciation of works and plant, and off the expenses of first establishment, as per balance-sheet, at the rate of 1 per cent. per annum. The profit for the half year after writing off these sums, amounts to £1749 10s. 9d., which together with £33 8s. 11d. the unappropriated profit of the preceding half year, makes the available balance £1782 19s. 8d. Out of this sum the directors recommend the declaration of a dividend at the rate of 7½ per cent. per annum on the preference capital, and 7 per cent. on the amounts paid up on the original capital, less income-tax; the balance of £38 5s. 10d. to be carried forward to the profit of the succeeding half year.

The dividend to be payable on the 20th of November.

By order of the board,
HENRY PALFREY STEPHENSON, Chairman.

8, *St. Mary Axe, E.C., Oct.* 10, 1873.

REPORT OF ENGINEER AND MANAGER.

Gas-Works, Singapore, Sept. 6, 1873.

To H. P. Stephenson, Esq., Chairman, and the Directors of the Singapore Gas Company,

Gentlemen,—Having forwarded to you the whole of the balance-sheets, statements of accounts, &c., showing the working for the half year ending June 30, 1873, I trust that they will be found correct, and that upon the whole the working will be considered satisfactory by the directors.

You will perceive by the returns that although the first cost of coals has been increased £216 5s. 6d. over last half year, we have an increase of profits on this side, and if you refer to the accounts for June 30, 1872, coals then cost us on the half year at the rate of £1 12s. per ton in the retorts, whereas this half year the cost has been £2 1s. per ton.

The increase in the half year on the legitimate gas-rental has been 182·36 dols. It will be more in the present half year, as the Chinese illuminations have just commenced, and will last about a fortnight.

Coke, breeze, and ashes have realized 3218·75 dols., being an increase over last half year of 2005·95 dols. Tar, liquor, &c., have fallen short by 173·43 dols.

During the half year the only addition to capital account has been the proportionate allowance for new services and some slight extensions to private houses in the Tanglin district.

The expenditure in the retort-room and the general works department has only been for the ordinary wear and tear.

General repairs have been effected where necessary; the buildings and plant are in a good state of repair. No. 2 gasholder is working satisfactorily, and there are no signs of decay in No. 1 gasholder, as by frequent tarring it is well preserved from rust.

All is still working satisfactorily in the purifying department.

Engineer's report furnishes all the details in this department. The unaccounted-for gas for the half year is 12 per cent.

Collection of rental has been satisfactory, as out of the amounts shown as due for the half year 31,775·70 dols., 30,843·67 dols. has been collected and paid to bank.

Bad debts and allowances and also the arrears are below the last half year's returns.

Loss by exchange has been 89·96 dols. on the 10,756·62 dols. remitted.

The fitters during the half year have been fully employed, 45 new houses have been lighted up with 482 lights. Additional lights 136, making a total on the half year of 618 lights.

Before concluding this report I will make a few remarks upon what may be considered the most important question of the day to gas companies, namely, "Coal and its cost." The directors will be glad to hear that we are provided with Australian coals for nearly the next twelve months; we have sufficient Australian in stock to take us on to December. The *Adelaide* chartered in England is expected daily with about 6000 tons. The barque *Hope* chartered on this side may be expected about November; she will bring about 800 tons, so that you will perceive we are pretty safe at present, and our agent at Newcastle, N.S.W., has instructions to take up other ships if they offer at reasonable rates of freight. The price of coal f.o.b. in Australia has advanced 2s., and is now 14s. per ton.

In conclusion, I have to apologize for my lengthened report, and it affords me great pleasure to inform the directors that the present half year will fully maintain the standard of last half year, and even more, as the coals to arrive will be slightly lower in price, and we shall obtain a further increase on the products.

I have the honour to remain, gentleman, your obedient servant,
E. J. WELLS.

Dr. *Balance-Sheet, June* 30, 1873. *Cr.*

Capital—				Cash at bankers		£829	8 7
£5 paid on 2000 pref. shares	£10,000	0	0	Ditto in hands of secretary.		4	12 9
5 „ 7829 ord. ditto	39,145	0	0	Bills receivable		1,900	0 0
2 „ 25 „ „	50	0	0				
1 „ 570 „ „	570	0	0	Office furniture		£164	14 6
10,424 shares.	£49,765	0	0	Cost of works and plant, as per last statement .	£32,922 13 4		
Debenture bonds	7,920	0	0	Add extensions during half year . . .	153 5 10		
Sundry creditors	1,068	7	2		£33,075 19 2		
Insurance reserve-fund. .	32	2	10	Depreciation at the rate of 1 p. ct. p. annum.	164 12 2		
Profit and loss	1,782	19	8			32,911	7 0
				Purchase of land		1,118	2 8
				Retort account . . .		814	18 8
				Meter renewal account . .		210	10 10
				Stock on hand		8,167	9 6
				Amts. charged to capital for travelling expenses, rent, preliminary expenses, and interest on capital during construction.	10,340 5 11		
				Less amt. previously written off. . .	337 13 3		
					10,502 12 8		
				Less amt. written off during this half year, at the rate of 1 p. ct. p. ann.	54 0 0		
						10,448	12 8
				Gas, meter-rental, fittings, and sundries under collection to June 1 . . .		1,380	5 7
				Gas, meter-rental, &c., for the month of June, and gas for public lamps for the half year		2,116	9 8
				Sundry debtors		307	10 0
				Travelling expenses, suspense acct., and sundries.		194	7 3
	£60,563	9	8			£60,568	9 8

Dr. *Profit and Loss Account, from January* 1 *to June* 30, 1873. *Cr.*

Coal carbonized	£2,336	14	5	Balance at profit and loss, Dec. 31, 1872.	£1,769 5 11		
Lime and oxide	17	9	5	Less amt. declared as dividend, after deducting income-tax on ordinary and pref. shares .	1,735 17 0		
Trade and general charges.	282	19	10			£33	8 11
Rent, rates, and taxes . .	86	7	10	Gas and meter rental . .		5,063	14 11
Directors and auditors . .	205	5	0	Products, profit on fittings, and sundries		1,153	18 7
Salaries and collector's commission	578	0	10				
Wages	313	5	3				
Int. on loans and debentures	276	18	2				
Loss on exchange. . . .	20	4	10				
Bad debts and allowances .	47	5	0				
Retort account	50	0	0				
Meter renewal account . .	20	0	0				
Depreciation on works and plant, and expenses of first establishment written off.	218	12	2				
Office furniture written off .	5	0	0				
Law expenses	10	0	0				
Balance—profit for appropriation	1,782	19	8				
	£6,251	2	5			£6,251	2 5

The CHAIRMAN moved—"That the report, with the balance-sheet attached thereto, be received, adopted, and entered on the minutes;" in doing which he compared the balance-sheet for the present half year with the corresponding half year, June 30, 1872. In round numbers, on the debit side the share capital account had increased £100; debenture bonds had been diminished £450; and sundry creditors had increased £202. On the credit side, cash at bankers and bills receivable had diminished £1222. The extensions during the half year had increased £153 5s. 10d., whilst there had been written off the sum of £164 12s. 2d., which more than balanced the cost of extensions; in fact, as to works and plant, it might be said that there was no increase. Last half year nothing was written off this account. Stock in hand had increased £1178, chiefly on account of the increased price of coal, iron, and other materials. With respect to the profit and loss account, coals carbonized had increased by £589, with an increase of gas and meter rental of £151. The other items on the debit side remained much about the same. The profit for appropriation was £41 less than on June 30, 1872. Turning to the credit side, products, profit on fittings, &c., had increased £296. So that, on the whole, it might be considered that the result of the half year had been satisfactory, considering the high price of coal, iron, and other materials.

Mr. R. RICE seconded the motion, which was carried unanimously.

The CHAIRMAN moved—"That a dividend be declared to the preference shareholders at the rate of 7½ per cent. per annum, and to the ordinary shareholders at the rate of 7 per cent. per annum less income-tax in both cases, on

amounts paid up on their shares from the respective dates of payment to June 30, 1873, such dividends to become payable on Nov. 20 next."

Mr. W. H. Le Feuvre seconded the motion, which was put and carried.

It was proposed by the Chairman, seconded by Mr. R. Wilkins, and carried unanimously—"That the thanks of the meeting be given to Mr. Wells, the manager and engineer at Singapore, for the zeal and energy manifested by him in the business of the company." The chairman, in proposing the vote, referred personally to Mr. Wells's great care, energy, and skill in the conduct of the company's business at Singapore.

It was proposed by Mr. R. Rice, seconded by Mr. R. Wilkins, and carried unanimously—"That the thanks of the meeting be given to the directors and local committee at Singapore for the manner in which the business of the company has been carried on."

The Chairman thanked the shareholders for the vote of confidence reposed in them.

It was proposed by Mr. J. Manwaring, seconded by Mr. R. Rice, and carried unanimously—"That a vote of thanks be given to Mr. R. King, the engineer and secretary in London, for his attention to the company's affairs."

The Chairman endorsed the sentiments set forth by the meeting, and the Secretary made an appropriate reply, which terminated the proceedings.

BAHIA GAS COMPANY, LIMITED.

The Ordinary Half-Yearly Meeting was held at the Offices, Coleman Street, London, on Tuesday, Oct. 21—H. P. Stephenson, Esq., in the chair.

The Secretary (Mr. A. J. Head) read the notice convening the meeting, and the following report and statements of account were presented.

The directors herewith present the accounts for the half year ending June 30, 1873.

It will be seen that as compared with the half year ending June 30, 1872, the private gas-rental has increased, but the cost of coal is higher, the total general disbursements are greater, and the amount received from products is reduced.

The Goverment at Bahia have accepted arbitration in reference to the difference as to the price of public lamps, and the arbitrators have been nominated.

The directors recommend the dividend to be at the rate of 10 per cent. per annum on the preference shares, and 3 per cent. per annum on the ordinary shares; after which there will remain from the profit of the half year a balance of £512 13s. 1d. to be carried to the credit of the profit and loss account.

The directors retiring by rotation are Mr. Henry Palfrey Stephenson and Mr. Frederic Lane Linging, who are eligible, and offer themselves for re-election.

The auditor retiring by rotation is Mr. Joseph Wright, who is also eligible, and offers himself for re-election.

Dr. *Balance-Sheet, June 30, 1873.* *Cr.*

Capital—				Concession	£7,000	0 0
5000 ordinary shares	£100,000	0 0		Investment	90,236	18 3
1000 10 per cent. pref. ditto	20,000	0 0		Aditional during half year	232	0 8
750 ditto redeemable ditto	15,000	0 0		Freehold land	4,705	2 7
250 ditto ditto, Dec., 1870	5,000	0 0		Meters fixed	2,397	0 10
				Office furniture and fixtures	413	3 7
	£140,000	0 0		Preliminary expenses	16,914	17 3
Creditors—				Amounts due for gas, fittings, &c.—		
On open accounts	2,210	1 9		Public lamps	4,108	5 8
On acceptances	2,795	15 1		Ditto suspense account	3,479	16 11
Loan account	2,500	0 0		Ditto establishments	4,073	15 1
Dividends unpaid	103	9 4		Exchange, Brazilian Government	502	15 11
Profit and loss	4,926	2 9		Private rental and fittings	4,075	15 4
Reserve-fund	34	18 6		Sundry accounts	35	1 7
				Stock—		
				Coals	5,144	18 9
				Coke	52	7 10
				Cotton seed pitch	83	11 4
				Turba	85	11 8
				Fittings	4,574	11 2
				Meters	521	11 4
				Mains, lamp-columns, and other materials	2,194	1 1
				Goods in transit	624	4 3
				Cash—		
				General account at bankers	141	4 6
				Dividend ditto ditto	103	9 4
				In London office	9	15 2
				London and Brazilian Bank, Bahia	401	6 8
				Manager at Bahia	459	0 8
	£152,570	7 5			£152,570	7 5

Revenue Account, for the Six Months ending June 30, 1873.

Coals carbonized (2612 tons)	£5,311	14 8		Gas supplied to public lamps	£8,771	3 11
Purifying materials	89	1 9		Less fines	362	0 8
Carbonizing wages	1,044	1 4			£3,409	3 3
Lamplighters wages	820	2 6		Private consumers	4,671	14 6
Yardsmen, labourers, &c.	281	13 11		Public establishments	1,006	16 9
Salaries	1,531	12 10		Meter-rental	419	10 0
Directors fees	400	0 0		Products	1,540	1 6
Auditors ditto	21	0 0		Transfer fees	2	5 0
Rent, taxes, and insurance	283	16 9		Profit on fittings	264	1 8
Interest	105	8 5		Bad debts recovered	168	6 8
Stationery	133	9 11				
Office expenses	46	4 3				
Keep of horses	101	10 11				
Trade charges	257	0 10				
Wear and tear	1,165	17 4				
Repairs and maintenance of public lamps	399	2 7				
Ditto of mains and services	189	18 4				
Travelling expenses	167	15 0				
Medical attendance	48	3 0				
Law charges	4	19 0				
Bad debts and allowances	66	12 11				
Profit	4,012	13 1				
	£16,481	19 4			£16,481	19 4

Profit and Loss Account, June 30, 1873.

Dividend declared, April 22, 1872	£3,500	0 0		Balance of account to Dec. 31, 1872	£4,476	3 9
Loss on exchange	62	14 1		Revenueaccount—net profit for this half year	4,012	13 1
Balance	4,926	2 9			£8,488	16 10
	£8,488	16 10		Balance	£4,926	2 9

The Chairman, in moving the adoption of the report, said he would draw attention briefly to one or two points in the accounts for the purpose of drawing a comparison between the present position of the company and its position at the corresponding period of last year. On open accounts there was, at the time the statements were made up, £112 more debt, and on loan account £500 more. On the other side of the balance-sheet it would be seen that the investments had been increased by £735, chiefly attributable to the laying of new mains and the erection of extra lamp-posts. The meter account had increased £417 by the purchase of new meters. There was one item on this side of the account which was rather unsatisfactory—viz., the "Amounts due for gas-fittings and public lamps," which had increased by £2792. That was the state of things on June 30, owing to the Government being very much behind in their payments. But he was happy to state that since then this amount had been all paid. Another item which was unsatisfactory to a certain extent was the "Private rental and fittings," which was £638 more in arrear than it was before. The directors had called the attention of the manager to this item, and urgently requested him to collect these rentals much closer. The stock of coals having begun to be somewhat worked out, was £1537 less than last year. This arose from the fact that the directors did not ship so much coal in the autumn of 1872, owing to the very high price which then prevailed, and the hopes they then entertained, but which had been greatly disappointed, that a fall in the market would take place. With reference to the cash balances, there was £218 less at the bankers; £316 more at Bahia, in the Brazilian Bank; and £459 in the hands of the manager there. Turning to the profit and loss account, it would be seen that the cost of coal carbonized had been £420 more in the half year. This arose in great measure from the increased cost of coal, though he might state that they had not yet got to the severe pinch which might arise in the succeeding half year. They had paid an increased price in the six months under review, but they had not paid so much as they would do in the current half year, and probably in the first half of 1874. Purifying materials were something less, salaries somewhat more; rent, taxes, and insurance have increased by £218, arising from the arrears of some former years having been paid during the last six months. The wear and tear account was £449 more. This arose from rather extensive repairs which had been done to one of the gasholders, which amounted to £300, and painting the house and premises of the company, £140. These had all been charged in the half year, and were somewhat exceptional. The bad debts, it would be seen, were considerably less. They were £928 less than in the corresponding half of 1872, and not only were they less as a matter of debit, but on the credit side of the account there was a sum of £168 6s. 8d. which had been recovered from debts previously written off as bad. The gas-rental had made some rather extra strides in the half year, showing an increase on private and public rental of £906. The meter rental had increased £54, and the profits on fittings £114. On the other hand, the products realized £272 less. The attention of the directors had been drawn to the question of products, which was not in so satisfactory a state as in their opinion it should be. The consumption of fuel during the first few months that Mr. Green was at Bahia was very heavy indeed, and the directors had called the attention of the manager particularly to this point. He (the chairman) was glad to say that for the months of August and September, the returns which they had since received showed a considerable improvement in this item. Having said thus much with respect to the accounts, he might call the attention of the meeting to the fact that the company were very short of working capital, and looking to the fact that in consequence of the increase in the rental it would be necessary to keep larger stocks of coal at Bahia, and looking also to the fact of the large increase in the cost of coal, iron, tubing and fittings, together with the heavy charges for freight, there was no doubt that the working capital at Bahia must be considerably extended, and the directors feared that they should shortly have to make some arrangement for the purpose. At present, pending the arbitration which was going on between the company and the Government, they felt that it was undesirable to put any scheme of the sort before the shareholders. They hoped that if the company were successful in this arbitration—and they believed they should be—the money coming to them would be sufficient to carry them on, at all events for some time to come. But, under any circumstances, if they required to increase the capital, it would be necessary for them, and it was their intention, to call a special meeting of the shareholders, and consult with them as to the best means by which the object could be carried out. With reference to the dispute with the Government, the report stated that arbitrators had been appointed, and he might add that since the report was printed and circulated the first meeting of the arbitrators had taken place. In Bahia business was not carried on in the rapid manner to which people in England were accustomed, but he hoped that before very long the company would be able to get a decision upon the matter, which had been pending so many years.

Mr. Nicholson, in seconding the motion, said the disagreeable portion of the chairman's remarks consisted in the intimation of the possible necessity for raising fresh capital. Undoubtedly this was a question of considerable importance, and one of so grave a character that it was natural to regard it with feelings of reluctance and repugnance. It had been in the minds of the directors for some time, but had been postponed again and again, until, as the chairman stated, the decision of the arbitrators in reference to the public lamps was given. At the last meeting of shareholders he (Mr. Nicholson) laid some of the facts in connexion with the arbitration before them, and he would only now state his conviction that—though, at times, curious things were done under the tropics, which were inexplicable to those who resided in temperate climes—there could be but one termination to the inquiry. The points at issue seemed to him to be so plain, that the only wonder was how any question came to be raised in respect to them for the arbitrament of two or three indifferent persons. However, so it was; and until that question was decided, the further consideration of raising fresh capital should be postponed. He himself had every confidence in the issue, and, if he was right, then the ugly question of fresh capital would be put on one side. If his expectations were disappointed, then the shareholders would have to be called together and consulted as to the best mode of effecting the object. There was one mode of raising fresh capital which would not infringe in any way the rights and profits of the ordinary shareholders, by converting the redeemable shares. The ordinary shareholders had been long-suffering, and he confessed for himself he was never more disappointed with anything than he was with the progress of this company. It seemed as though it had been inaugurated under some unlucky planet. Ever since he became a director, some years ago, they had been constantly fighting against difficulties, and redressing grievances occasioned by first mismanagement; and just at the moment when it seemed that they had successfully battled the storms, and were getting into smooth water, having passed the rocks and breakers, there started up before them the formidable question of the rise in the price of coals, coincident with the advance of freights. Every ton of coal they were now carbonizing at Bahia cost them £1 a ton more than it would have done two years ago, so that if they carbonized, say, 5000 tons of coal annually, they required an additional capital of £5000 for this item alone. Added to this was the increased cost of iron, of fittings, and almost everything else which went to make up the working expenses of the company, so that it was just possible the directors might be driven to the necessity of taking steps to raise new capital. A company like this had not the compensating advantages of a rising market in coke which a London company had. Here, as coals advanced, residual products advanced in something like an equal ratio; but in Bahia the inhabitants did not understand the use of coke, and it would be a long time before they were educated to it. The directors were therefore obliged to consider the possibility of such a necessity as that to which he had adverted; but they would not propose any measures in reference to it so long as it could be avoided.

Mr. Lambert said the report itself did not disclose any necessity for new capital, and it would be a very unpalatable proceeding so long as the company paid only 3 per cent. He was disappointed with the state of things in the company, and thought the expenditure, which amounted to 75 per cent. of the revenue, was enormous. Many other companies worked at 50 per cent., and the highest did not exceed 60 per cent. In this company the expenses seemed rather to increase than to diminish. The income was very good, but why so large a portion of it was required to be expended year after year he could not understand. As a practical man, the chairman must see that the expenditure was out of all proportion.

The CHAIRMAN admitted that they were very large, and said a considerable demand was made upon the revenue every year owing to the defective way in which the works were originally constructed.

Mr. MORRISON said he did not take a gloomy view of the question of raising fresh capital, and if the arbitration was settled in favour of the company, they would not require to raise any. He believed the amount in dispute was about £5000.

Mr. NICHOLSON said, according to one view of the case which had been put before the arbitrators by the company, the Government had been paying 40 reis per lamp per night too little—i.e., 195 reis per lamp instead of 235. According to another view, the payment should have been at the rate of 200 reis. In the latter case the award would be about £4000, but in the former view it might be eight times £4000, added to which there was the question of interest for many years back. If the company only recovered the £4000, it was doubtful whether they would require any fresh capital.

Mr. MORRISON said he thought, if more capital should be required, the plan of raising it hinted at would be a very acceptable one.

Colonel WILBRAHAM referred to the items in the revenue account—keep of horses, £101 10s. 11d., and fines, £362—and asked for an explanation.

The CHAIRMAN said the horses were kept for the manager, engineers, and inspectors to ride about on, and the cost last half year was increased by the purchase of a new horse. The fines were large, the company being under strict superintendence by the municipality. The concession left this matter entirely in their discretion.

The motion was put and carried.

The CHAIRMAN moved—"That a dividend at the rate of 10 per cent. per annum on the preference capital, and 3 per cent. on the ordinary capital of the company for the half year, less income-tax, be and the same is hereby declared."

Mr. LINGING seconded the motion, which was put and carried.

The retiring directors and auditor were severally re-elected, and a vote of thanks having been given to the board, the proceedings terminated.

GEORGETOWN (BRITISH GUIANA) GAS COMPANY, LIMITED.

The Ordinary Half-Yearly Meeting was held at the Offices, 60, Cornhill, London, on Tuesday, Oct. 28, the Vice-Chairman—H. P. STEPHENSON, Esq., presiding.

The SECRETARY (Mr. A. Lass) read the advertisement convening the meeting, and the following report and accounts were presented:—

The directors have much pleasure in submitting to the shareholders the accounts of the company, for the half year ending the 30th day of June last.

As the city of Georgetown was lighted with gas on the 31st day of January last, the directors are now able to present to the shareholders a revenue account for the five months ending the 30th day of June last, and they have great satisfaction in stating that the net profits during that period have amounted to £865 6s. 11½d., out of which the directors recommend the declaration of a dividend for the six months ending the 30th day of June last, at the rate of 5 per cent. per annum, free of income-tax, leaving a balance of £263 0s. 11½d. to be carried forward to the next half year.

The engineer reports that the works are in good order.

The dividend will be payable on the 1st day of December next.

Dr. *Balance-Sheet, June 30, 1873.* *Cr.*

Share capital—				Fixed plant, mains, and services			
6200 shares, at £5	£31,000				£26,363	6	2
Less amounts not called up, and calls unpaid	3,412			Meter account	1,068	8	10
	£27,588	0	0	Retort ditto	342	16	1
Debenture bonds	1,800	0	0	Stock in hand	3,454	10	0½
Bills payable	3,157	0	11	Cash at bank and in hand	1,046	14	1
Amounts owing to sundry persons	650	9	2½	Amounts owing by sundry persons	1,785	1	10½
Profit and loss account—net revenue	865	6	11½				
	£34,060	17	1		£34,060	17	1

Revenue Account to June 30, 1873.

Coals and bitumen	£521	15	8	Gas, rental of meters, products, fittings, and sundries	£2,683	3	8½
Purifying account	4	15	0				
Wages ditto	442	3	3½				
Meter renewal & repairs do.	8	19	6				
Retort renewal ditto	7	3	11				
Salaries	442	8	2				
Rent, rates, and taxes	65	12	6				
Directors and auditors fees	103	10	0				
Trade and general charges	53	10	1½				
Exchanges account	23	6	8				
Bad debts and allowances	35	1	0				
	£1,708	5	10				
Balance, carried to profit and loss, net revenue	974	17	10½				
	£2,683	3	8½		£2,683	3	8½

Profit and Loss Account, Net Revenue, June 30, 1873.

Interest on loans, debentures, &c.	£109	10	11	Revenue account—balance brought down	£974	17	10½
Balance, being amount available for dividend	865	6	11½				
	£974	17	10½		£974	17	10½

The CHAIRMAN moved the adoption of the report, remarking that Georgetown having been lighted up at the beginning of February, the accounts now presented embraced five months working of the company. Of course, at the commencement, their gas-rental was not very large, but it had been progressively increasing. To a certain extent there was some little difficulty in reference to the accounts, it being a split half year, and in apportioning charges to capital and revenue respectively; but the directors had done it in a way which they believed was fair and proper. According to the balance of profit made during the five months the directors might, as would be seen, have paid a larger dividend than they now proposed to declare, but looking to the fact that the accounts referred to the first five months working of the company—looking also to the fact that some of the profit made had been from extraneous sources, and sources which might not be available in the next half year—they thought the more prudent course was to recommend a dividend at the rate of 5 per cent. only. They were anxious to see their way fairly and fully to maintain the rate with which they started, and were persuaded that it was not desirable for a new company to begin with a large dividend which afterwards it might become necessary to reduce. Dividends of gas companies, to his mind, should always be on the ascending and not on the diminishing scale, and, believing the proprietors would concur in that principle, he had confidence that they would endorse the policy of the directors as wise and prudent. There was one thing he regretted in reference to the accounts. It would be seen that on this occasion the directors had been compelled, in the revenue account, to lump together in one item the gas-rental, products, and profit on fittings. There were proper and sufficient reasons for putting them together in this statement, but he hoped in the next accounts these several particulars would be separated, as was usually done among gas companies. There was just one other point to mention, and that was with regard to the borrowing powers of the company. The directors thought it desirable to exercise their borrowing powers to some extent, and as was stated in the last report there was a very large sum applied for in debentures. It amounted in this country to £1800, and in Demerara to something like £40,000. The directors sent out bonds there to the extent of £4000 only; but on their arrival it was found there was a little defect in the original ordinance as to the form in which the bonds were prepared. The company were under colonial law, and it so happened that the joint-stock law of Demerara was repealed the day before the company were incorporated. This had necessitated an application for an amended ordinance. The directors had received advices that this amended ordinance would be passed next day, and then there would be no difficulty as to their borrowing powers. But on the present occasion they proposed to take a resolution from the shareholders to enable them to exercise those powers, and thus effectually to set right the little defect which was the fault of the legal authorities in Demerara.

Mr. THURBURN seconded the motion for the adoption of the report.

A SHAREHOLDER said he observed that there had been an increase in the capital of the company by a further issue of shares on the responsibility of the directors alone, which he thought was undesirable.

The CHAIRMAN said the directors had full power to do so. The shares were applied for by an existing shareholder in the country, and it was thought well to allot them.

The motion was put and carried.

The CHAIRMAN moved—"That a dividend for the half year ending the 30th of June last be declared at the rate of 5 per cent. per annum, free of income-tax, and that the same be paid on the 1st of December next."

Mr. DRYSDALE seconded the motion, which was carried.

The CHAIRMAN moved—"That the directors be authorized to borrow upon mortgage of the undertaking of the company or debentures, such sums as they think fit, not exceeding in the whole the sum authorized by the company's ordinance, and from time to time to renew any mortgages or debentures that may fall due."

Mr. THURBURN seconded the motion.

The CHAIRMAN, in reply to inquiries, said the amount which the directors had allotted in this country was £1800, and in Demerara £4000, making together £5800, and they believed that this would be sufficient for all their working purposes, leaving them still £1 per share to be called. Some shareholders had paid up their calls by anticipation, but there still remained unpaid about £3400. The directors did not see any necessity at present to call up that amount. Hereafter, as extensions were required, it would become necessary. By their ordinance the share capital of the company was limited to £40,000, and the borrowing powers to £10,000.

The motion was put and carried.

The CHAIRMAN said it had been found somewhat inconvenient to hold the meetings of the company in April and October, and he submitted a resolution that in future they be held in May and November.

Mr. WHITING seconded the motion which was agreed to.

A SHAREHOLDER remarked that the dividend just declared had been obtained from profits earned under contracts for coal made before the advance in price.

The CHAIRMAN said that was not the case. The profits were made upon five months working of the concern with coal purchased after the rise in price had taken place, but before the extreme in price had been reached. The coal was bought at 12s per ton f.o.b.; within the last six months coal had been selling as high as 23s., and could now be bought at 16s. f.o.b. This company were using coal with a certain proportion of Trinidad bitumen to bring up the illuminating power. They were supplying gas of 16 or 17 candles power, and using from 10 to 15 per cent. of bitumen, which they had laid into the works at about 30s. per ton, coal costing 35s.

Mr. STOKES moved a vote of thanks to the directors, and expressed his satisfaction with the results of the working of the company as laid before the meeting.

Mr. R. KING seconded the vote which was cordially agreed to.

The CHAIRMAN, in acknowledging the compliment, said the directors had gone through most of their hard labours in the erection of the works, and now the success of the undertaking greatly depended upon the future policy as to the consumers in Georgetown. The company were charging a high price for gas at present—18s. 9d. per 1000 cubic feet—and the directors would shortly have to consider how far it might be prudent and desirable to reduce the price in order to increase the consumption. The question required to be approached with great caution, and it was one to which the directors would give their serious attention.

GAS AND WATER WORKS FACILITIES ACT, 1870, AMENDMENT ACT, 1873.

The following Provisional Order has been applied for by the corporation of Glasgow:—

GLASGOW CORPORATION GAS.

"*Provisional Order to amend the Glasgow Corporation Gas Act*, 1869, *in relation to the Maximum Price of the Gas supplied by the Corporation.*

"1. This order may be cited as 'The Glasgow Corporation Gas Order, 1873.'

"2. In this order the expression 'the corporation' shall mean 'the Lord Provost, magistrates, and council of the city of Glasgow.'

"3. From and after the commencement of this order, and during the continuance thereof, the price to be charged by the corporation for gas supplied by them and consumed by meter shall not exceed the rate of 6s. per 1000 cubic feet, and during the continuance of this order section 67 of the Glasgow Corporation Gas Act, 1869, shall be read and have effect as if the words '6s. per 1000 cubic feet' had been inserted therein, instead of the words '4s. 7d. per 1000 cubic feet.'

"4. This order shall take effect on and after the 1st day of November, 1873, and shall continue in force until the 31st day of October, 1875, both days inclusive.

"5. All the costs, charges, and expenses of and incidental to the applying for, preparing, obtaining, and confirming this order, and otherwise in relation thereto, shall be paid by the corporation out of any gas revenues in their hands, or out of money borrowed by them under the Glasgow Corporation Gas Act, 1869."

The application by the Maryport Town and Harbour Gas Company for a Provisional Order has been refused.

The applications of the Glasgow and Burnley Corporations for Provisional Orders are still under consideration.

The application of the Cork Consumers Gas Company for a Provisional Order will be the subject of a local inquiry, which is fixed to commence on the 12th inst.

BOARD OF TRADE INQUIRY AT WREXHAM.

(*Before* G. A. VERNON HARCOURT, *Esq.*)

WEDNESDAY, OCT. 15.

This was the first inquiry upon an application under the Act of last session. The Wrexham Gas Company was incorporated in 1871, and the maximum price to be charged by them for gas within one mile of the parish church was by their Act fixed at 4s. per 1000 cubic feet; beyond one mile, and within two miles, 4s. 6d.; and beyond that distance 5s. per 1000. The company applied for a Provisional Order to increase the price 1s. per 1000 cubic feet in each of the districts, as and from the 29th ult. Against this application the corporation presented a petition. There was also a petition lodged by certain ratepayers in the borough.

Mr. ENOCH GIBBON SALISBURY appeared for the company, and Mr. W. H. MICHAEL for the corporation.

The COMMISSIONER opened the inquiry by reading the order of the Board of Trade empowering him to attend, and explaining briefly the circumstances which had given rise to the application. It was known that, in consequence of

the rise in the price of coal and other materials used in gas manufacture, companies whose maximum amount of dividend, and also the maximum amount to be charged for gas, was fixed by Act of Parliament, were brought into a difficulty. In consequence of this, and for the sake of enabling gas companies to obtain relief under these circumstances, and especially for enabling them to obtain relief during the parliamentary recess, an Act was brought in by the Government and passed at the close of last session, enabling the Board of Trade to issue Provisional Orders which should have the same force as an Act of Parliament, and by virtue of which they altered the maximum price of gas charged by a company with the view of preventing undue loss to undertakings arising from the increased cost of production. The 13th clause of the Gas and Water Works Facilities Amendment Act, 1873, provided that a local inquiry should be held for the purpose of obtaining further information if necessary. Having referred to other provisions as to the mode in which application is to be made to the Board of Trade for the relief asked for, and also as to the depositing of memorials against such application on behalf of gas consumers, the commissioner said the present inquiry was for the purpose of receiving information which would be subsidiary and supplemental to the information already supplied to him. For his part he did not wish to shorten this inquiry, but he did not see that there were any facts requiring a protracted statement, and he hoped it might be possible to conclude the inquiry that day. He would just state the documents already received. The Board of Trade in the first place received an application from the gas company for a Provisional Order (together with a draft Provisional Order), which stated the difficulties in which the company found themselves, and asked for an increase of 1s. in the price per 1000 feet for each of the three distances. A memorial had also been sent by the Wrexham Town Council against the order, which stated that the reason why the gas company was unable under existing circumstances to pay a reasonable dividend, depended not on an unusual increase in the cost of material required for gas manufacture, but on account of an excessive increase of capital on the part of the company. He had also a requisition from the ratepayers against the Provisional Order, taking a somewhat different ground, namely, that at the time of passing the Act of 1870, it was understood that the price fixed should be permanent. This ground, he must admit, did not appear to him very forcible, for this reason, that the passing of the Act of last session contemplated the revision of private Acts of gas companies passed at an earlier time, and before the increase in the price of materials for gas manufacture had taken place. He had also received replies to questions issued by the Board of Trade under the powers of the Act, which empowered them to make rules with which companies applying for a Provisional Order must comply, giving a number of particulars as to the cost of gas manufacture, &c.

Mr. MICHAEL said he should have been glad if the inquiry could be closed in one day, and possibly it might have been had the gas company afforded the information requested of them some time ago by the corporation, who had never seen the particulars furnished by them to the Board of Trade, and on which they grounded their application. As the gas company had thought fit to furnish them with no figures whatever, he was sorry to say he could not make the inquiry so short as he could wish, as he must consider the information before bringing before the court the facts and reasons why, in the opinion of the corporation, this increase should not take place. Of course, they were considerably in the dark. The Town Council could not know what were the facts and figures furnished by the gas company except so much as was furnished to the public and local authorities through their abstract of accounts. What they wanted was information as to the area of supply, cost of production, price charged, amount received, and capital expended. He must ask that an order be made on the gas company to furnish this information, in order that he might analyze it before the sitting of the court on the next day.

Mr. SALISBURY said he expected his friend would make this application. Of course, the solicitors acting for the company could not comply with an application of that nature until they had had an opportunity of conferring with him. He told the solicitors they were quite right in refusing the information required by the memorialists, and he asked the commissioner not to make the order, and he would in a few words give the reason why. The company applied for a revision of their price under the Act of last session, and in doing so they were not bound to do more than the Act required. The Corporation of Wrexham had no right to ask them for the information they were now seeking. The Board of Trade were entitled to ask for information, and they had done so, and the company had complied with their request; but the Corporation of Wrexham, who were memorializing against this application, had no such right. If they wanted the information, they ought to have applied to the Board of Trade for it. They had not thought proper to make the application there because they knew perfectly well it was an improper application to make.

Mr. MICHAEL said the corporation had applied to the board.

Mr. SALISBURY: And they have refused it?

Mr. MICHAEL: I do not know.

Mr. SALISBURY: Well, if the Board of Trade comply with your request, you do not want the information from us; if they refuse it, we have a fair right to assume that they do not feel justified in granting it.

Mr. MICHAEL said he could get the information from the company's witnesses in cross-examination, but it would protract the inquiry.

Mr. SALISBURY suggested that if the commissioner thought the company had not given all the information necessary to found a fair judgment on the case, and was satisfied him that they could give something more, the proper time to consider the matter would be when deciding whether the inquiry should be adjourned to a future day.

The COMMISSIONER said he should prefer that to settling the point now. If it appeared, as the inquiry proceeded, that important information had not been supplied which was necessary, he would ask for it.

Mr. SALISBURY then proceeded to state the case for the company, and began by giving a short history of their undertaking. The company, he said, was founded in 1839. The promoters were traders in the town, and were desirous, of course, of having their places of business supplied with gas. They erected works which they thought at the time were sufficiently large for the purposes of the town, and they put up their works at their own cost. They began to supply gas in 1841, charging 12s. per 1000. A short time after they made a reduction to 10s. That continued down to 1845, when they again reduced the price to 8s. per 1000. The company had to extend their works from time to time as their customers increased, and although the consumption was not large, still the undertaking seemed to prosper. With prosperity they naturally reduced their prices, with the view of increasing their customers. This could not be done without spending money in the construction of additional works and the extension of their mains. The money was expended wisely at the time, and gave the board and shareholders general satisfaction. This continued until November, 1869. Some time before—so early as 1860—there were gas engineers who made it a practice to advertise that gas could be manufactured at lower prices, and that it would be advisable for consumers to erect gas-works for themselves. There was some talk about establishing a rival gas company in this town. It was said they were in the centre of the coal district, and could get materials very cheap, that the company would pay 10 per cent. to their shareholders, and therefore it must be a good undertaking. There were people in this as in other parts who were always tempted with 10 per cent., and were very desirous of investing their money. At that time the company had no Act of Parliament. They were an incorporated company under the Joint-Stock Companies Act, and they were breaking up streets without parliamentary authority. They were advised in 1869 to go to Parliament for an Act to authorize them to extend their district, to fix the maximum price of gas, and to increase their capital. In 1870 the bill came before a committee of the House of Commons, where it was opposed by the corporation. The Act, however, passed, and the limits of the company's area were thus defined:—"The parliamentary borough of Wrexham and the townships of Wrexham Regis, Wrexham Abbot, Acton, Esclusham Below, Stansty, Broughton and Bersham, in the parish of Wrexham, and Erthig and Gwersyllt, in the parish of Gresford." The company in their Act knew nothing whatever of Wrexham proper. These were their gas limits; and if they thought proper to spend the whole of their capital in supplying the district, they would simply be doing that which the Act of Parliament authorized them to do. In the Act there was a provision that they were to supply particular districts upon the terms named. Clause 65 limited the price of gas. Before this Act was passed there was no limitation, and the company could charge any price they thought proper. This clause provided that gas supplied within the borough should not exceed 4s. per 1000; gas supplied not within the borough, but within a radius of one mile from the centre of the doorstep of the north porch of the church of St. Giles (or the parish church), 4s. 6d. within a radius of two miles, and 5s. for gas supplied beyond the radius of two miles. The company asked for a higher maximum price, but were opposed by the corporation. Their objection to the price the company put in their bill (he believed 4s. 6d.) was to this effect—that they were in the centre of a coal district, and could get their coal for 11s. or 11s. 9d. per ton, while other towns had to pay 16s. or 17s. per ton. The result was the Act was passed in the form in which they found it. Section 22 dealt with the capital of the company, which was fixed at £50,000, with the usual borrowing powers. Section 25 gave them power to raise the new capital required by ordinary shares or stock, or preference shares or stock, or partly by ordinary and partly by preference shares. They could, therefore, have raised their new capital at a preferential dividend; but they raised it in the ordinary way. Their paid-up capital at the time was £12,000, the dividend on which was limited to 10 per cent.; while the dividend on the new capital was fixed at 7 or 6 per cent., according as the shares were issued as ordinary or preference. Last year the company received only 3¾ per cent. dividends on their capital. The company had honestly fulfilled all the obligations imposed upon them to the best of their ability, and they had never abused any one of the privileges conferred upon them. It was implied in the memorial presented to the Board of Trade that the company had spent a large amount of their capital on their works wrongfully, and that they had spent that capital improperly; but he would satisfy the commissioner that the expenditure of that capital was necessary in the interest both of the company and district; nay, that it had been wisely spent, that the works had been cheaply constructed, that it was most fortunate for the company and the town that the expenditure should be made at the time, and that it would have cost a great deal more money if the works had had to be constructed now. The report of the company, dated the 10th of August, 1870, stated that in consequence of the fire at the old works the directors had decided that, instead of expending any more money on those works, it would be more advantageous to erect works on the new site, an arrangement having been made with Mr. Peter Walker to purchase the old works. To carry out these alterations they asked for authority to create 1300 shares at £10 each. On the 30th of June they had spent £15,500 13s. 3d., a capital which was more than they had received, and there was a balance against them of £500. He was proud, however, to think that some portion of this money had gone to himself and his learned colleague, for he found an item of £844 on account of parliamentary expenses in obtaining the Act.

The COMMISSIONER remarked that, on looking at the report, he saw that during the last two years the reserve-fund had continually dwindled down, so that the dividends had not in reality been paid out of the earnings.

Mr. SALISBURY said, if they had not done so, they would not have been able to pay any dividend last year. Referring to the next report, which was dated Aug. 29, 1871, he found the directors stating that the difficulties in constructing their new works had been successfully overcome, and that, although the outlay had been large, the works had been constructed to meet the requirements of the town and neighbourhood for many years; and they had paid a dividend of 10 per cent. on ordinary old stock, and 7 per cent. on new ordinary stock. Turning to the capital account, they had increased that to £25,800. Although they had been conducting the works as cheaply as possible, at the end of August, 1873, their dividend had been reduced to 3¼ per cent. for that year, and they had been compelled in the three years to use the whole of their earnings, and some which stood to the credit of their profit and loss account. But for that he was afraid they would not have been able to pay any dividend at all. On the 30th of June, 1870, the company started with an expenditure of £15,500. They sold the site of their old works for £2092. Of the capital they had since raised and expended, they had spent upon works and buildings in three years £14,358. That was upon new works and buildings, gas apparatus, engines, machinery, and pipes connected therewith, and the gasholders; and they had spent upon mains and services £3406. He called special attention to that, for no doubt the ratepayers in Wrexham imagined that they had spent £10,000 or £12,000 on the out-districts; but this was the measure of the expenditure for mains and services not only within the borough, but also in the outlying districts. Then upon the new meters, on which they received a rental, they spent £368; for additional land, £486; and they paid a balance of £934 for parliamentary expenses, the total capital expended being £32,961. This brought them down to 1873, and he must call attention to the report of the directors, dated Aug. 20, for that year. The directors stated that gas had been laid on to 66 public and private houses during the year, and the rental had increased notwithstanding the early closing of places of business. Then they said that, owing to high prices, there had been a greater demand for coke at increased rates, and the receipts for residual products had exceeded those of the previous year by upwards of £400. Inferior coals had cost the company 60 per cent. more than in the previous year for coal of good quality; wages, retorts, lime, everything connected with the manufacture of gas had increased. They had now to pay 8s. per ton more for coal than they were paying when they got their Act of Parliament, and therefore he contended that their request to be allowed to charge an extra 1s. per 1000 was a reasonable one, if put upon that ground alone. Parliament saw at once that the conditions under which the shareholders had invested their capital were entirely changed, and that they would lose all chance of getting any profit upon their outlay unless they stepped forward immediately and gave them relief by this general Act of Parliament. They did not allow the gas company to apply for this advance in order to keep up their rate of dividend to 7 or 10 per cent., but they restricted them to the average of dividends paid during the past two years. In fixing the dividend, 10 per cent. of a good year was put with 3¼ per cent. of a bad year, and all that was asked was an average that should in no case exceed 5 per cent., and when the dividend paid on the increased price was limited to £4 12s. 6d., he should have hoped the corporation would have considered that this was a fair price, and not have objected to it, especially when it was known that the Provisional Order would only extend over two years. But the corporation memorialized against this application, and the grounds of their objection were that "there was no need for such a large increase in the capital of the company from £15,500 in 1870 to £35,000 in 1873 for any purposes connected with the supply of gas in the borough of Wrexham; but if there had been any necessity for such a large increase of capital it had been in connexion with the operations of the company outside the borough of Wrexham." In reply to this, he remarked that the whole sum spent on mains and services had only been £3400; and that upon the expenditure of capital in the out-districts they had received in the past year a larger return per cent. than they had upon the entire capital of the company in the year, and if they had not made these

extensions they would not have been in a position to pay 3½ per cent. upon the whole. If he was not mistaken, those gentlemen who were now finding fault with the company for spending money were the same who appeared before the committee of the House of Commons in 1870, and said that the company ought to build new works; and it was upon the site approved by the House of Commons that the works had been erected. They said further in their memorial to the Board of Trade that—"Gas coal of a superior quality was raised near the town of Wrexham, and could now be purchased for 18s. per ton, and therefore there was no reason for an increase in the rate of gas on the ground of the increased cost of coal, as the price of 18s. for coal had been the lowest at which many gas-works in England had been able to purchase their coal prior to the advance in the price of coal in the year 1871." But that was no reason why Wrexham should do it, for other towns might have a large population, and still have only about the same expenses, for it was the quantity sold that enabled the price to be lowered. The memorial also said that there was in the neighbourhood of Wrexham cannel especially adapted for the manufacture of gas; but he would like to know where it was. Having referred to other points in the memorial, Mr. Salisbury closed by urging that the company had not been wasteful in the expenditure of capital, and that the price of material had increased very much in this district during the past 12 months. It was absolutely necessary that they should have an increased price for their gas if they were to have any dividend at all upon their outlay, for their own profit and for the good of the public.

The following evidence was then called:—

Mr. *William Overton:* I am chairman of the Wrexham Gas Company, and have been connected with it from its establishment. I gave evidence before the parliamentary committee when we applied for our bill, and the question as to the site of the works was then discussed. There was a strong objection to the old site, and it was thought advisable to remove to the new site. After the bill passed there was a fire at the old works, and then we had to consider whether we would rebuild the old works or erect works on the new site. We were advised to abandon the old site and to remove the works to where they now stand. We could not have extended on the old site, the work being hemmed in on all sides. The new site is a few hundred yards from the old one. In my opinion there was no waste at all in constructing the new works, and we used the greatest possible economy, and tenders were entered into for all the different works as they were required. It was our interest to lay out as little money as possible, and I do not see how we could have expended the money more judiciously. Having erected our new works, we took into consideration the desirability of extending the supply of gas; in fact, that was one of our chief inducements to erect the works, as they will be sufficient to meet the requirements for a good many years to come. There had been complaints about the insufficiency of the supply of gas in the town, and we could only just keep pace with the demand. Then we had to take up the old main, and to put a new main down of a larger size. Then we extended to Coedpoeth, and if we had not done so, there was a prospect of a gas company being formed for that place, in which case we should have lost the opportunity of supplying Coedpoeth. We fully expect a fair return for our outlay in that direction, Coedpoeth being as populous as Wrexham was when we first supplied it with gas. The extension is paying at the present time, and we expect that it will be better still when it is further developed. Then we have extended the main to Acton Park, and there was an agreement with Mr. Lonsdale to pay a fair return for our outlay. There was also an extension to Cefn Park and Coedyglyn. The extensions have paid 4½ per cent. upon the outlay.

Cross-examined: Cefn is within the limits of the Act of 1870, it being not more than a mile from the town, in the parish of Wrexham. We have laid two or three miles of main to Coedpoeth. We have laid down about three miles towards Coedpoeth without one consumer, but we have a prospect of a very good one within two miles. I cannot tell what the annual rental is accruing from Coedpoeth, although we made a calculation as to what it would be beforehand. I am not certain whether a circular was sent out to the inhabitants, asking them if they would take gas, but a personal visit was paid to the place by our secretary. I think about £2000 was expended in laying the main to Coedpoeth. The question of erecting new works had been discussed before the parliamentary committee in 1870, we having new works in contemplation at that time. We were then erecting a large gasholder on the new site. The report of the company, dated the 24th of September, 1869, states that "the facilities for manufacturing which the company possessed, with a steady and continued increase of consumption, encouraged the directors to hope that at no distant day, and in the absence of any unforeseen circumstances, they would be enabled to offer a still further reduction in the price of gas to the consumers." We had at that time certain facilities, but nothing compared to the facilities we have at the present day. I cannot remember whether new retort-houses had been completed when we went to Parliament in 1870. Before the parliamentary committee I stated that our retort-house would be sufficient for some years to come, and also our gas-holding capacity; but the burning of our offices, the other changes that were going on, and an opportunity presenting itself of disposing of the old works, induced us to change our opinion. The fire resulted in the destruction of our office, which was insured, but I cannot say to what amount. The governor and the station-meter were destroyed. I cannot exactly say how much money we spent on the new works; it may have been about £14,000 or £15,000. The new shares issued in 1870 were allotted to the old shareholders, but I do not know how many more shares were applied for.

Re-examined: I think it was the duty of the company to remove the works to the new site, and we thought we were meeting the public requirements by doing so. The price of shares had nothing to do with the creation of new capital, and that never entered into our consideration at all. We believed we were only honestly doing what we ought to do in extending the works.

Mr. *Thomas Walker:* I am the manager and secretary of the company. I have supplied all the statements required for this application to the Board of Trade. The capital consists of £12,000 of consolidated stock, £13,000 of what is called the first issue, and £2500 second issue, and we have borrowed £7500, making a total of £35,000. We can borrow no more unless we issue fresh shares. We pay 4½ per cent. on the borrowed money. Since the passing of the Act we have received capital to the amount of £12,000, and by loan £3000. The whole of that capital has been devoted to the purposes of the company. The erection of the works and plant cost £14,358 2s. 4d. up to the 30th of June last. Upon mains and services we have expended £3406 2s. 4d.; upon new meters, £368 8s. 6d.; land, £486 17s.; parliamentary expenses, £934 3s. 2d.; and after deducting £2092 8s. received for old works, the expenditure remains at £32,961 18s. 7d. The old six-inch mains in the town of Wrexham have been replaced by a 15-inch, and we have also laid some small mains in Hightown, and they are accounted for in the £3400. The new main to Coedpoeth is about 3½ miles long, and it is a 6-inch main finishing with a 3-inch main at the further end. There are 5000 or 6000 people in Coedpoeth, and close by there are Talwrn, Adwryclawdd, and Penygelli, and other places. The length of the main to Cefn is about a mile and a half, and it is within the two mile radius, and, I believe, within the parliamentary limit. I never heard it disputed before to-day as to its being within our limits, and I always took it for granted that it was. Sir Roger Palmer paid half of the cost of the new main to his place, and he has therefore paid for more than is outside the borough of Wrexham. As to laying of the main to Acton Park, there was an arrangement between Mr. Lonsdale and the company. The extension to Coedyglyn was made before the passing of the Act. Our earnings for the year ending June 30, 1871, were £1210 17s. 1d.; for the year ending June 30, 1872, £1463 13s. 1d.; for the year ending June 30, 1873, £1147 13s. 10d. In 1871 we paid dividends at the rate of 10 per cent. per annum on the consolidated stock, and 7 per cent. on the new shares. In 1872, 6 per cent. on each. In 1873, 3½ per cent. for the year, it being in the first half year at the rate of 4 per cent., and in the second half year at the rate of 2½. In the half year ending June 30, 1871, we paid 14s. 9d. a ton for cannel, and 14s. 6d. for cannel, the cannel rising immediately after that. In 1870 we paid 10s. for coal, and 12s. 3d. for cannel. In 1872 we paid 10s. 10d. for coal and 16s. 6d. for cannel. For the year ending 30th of June, 1873, we paid 17s. 6½d. for coal, and for cannel £1 1s. 5½d. Those are the prices for the coal to be delivered at our works. In my evidence before the parliamentary committee I said the contract price for coal was 9s. 7d. per ton, which included 1s. for cartage to the works. The price of cannel at that time was 12s. 3d. delivered at the works. It is what is called Leeswood cannel. We get the same kind of cannel now, but not of such good quality. The price now is 27s. per ton at the works, and that is the price we paid last time. We entered into a contract for coal in July, 1873, which expires on the 31st of March next, and the cost is 20s. 1d. in the yard. We have no contract for cannel now. The coal is not always the same, and is sometimes very inferior, and at other times it yields a fair return of gas. We have sometimes great difficulty in obtaining gas coal in the neighbourhood in consequence of the great demand. We have to take what we can get or go without. The Leeswood Colliery is now supplying us with cannel, and they say that unless another seam is found, the present seam will not last more than a month. We pay 25s. 6d. for it at Wrexham station. I have applied to the colliery for coal, but we have been unable to get any from there. The Wigan Cannel Company about two months ago offered to supply us at 45s. a ton. Our stokers wages have risen 50 per cent., and the material we have to use has also gone up. Lime has increased 5s. 6d. a ton. An increase of 1s. in the price of gas is a fair sum to be asked. The directors have economized as much as they could. There are nine of them, and their remuneration is £75 per annum between them all. I do not think we shall ever be able to pay working expenses unless the increase is obtained. I do not know in this district where I can get superior coal for 18s. a ton. The price we pay at present is 20s. 1d., which includes cartage from the station, 1s. 3d.; but the coal is not so good as the coal we used to have.

Cross-examined: I am manager as well as secretary. I was not manager at the time the Act was obtained in 1870. The 15-inch main cost about £800; in round numbers £2200 was expended besides within the one-mile radius. The total length of main to Coedpoeth is 3½ miles. At the present time we have on it 42 consumers. The gas consumed last year was 521,000 feet; the total revenue is £130 at 5s. per 1000. The main to Cefn is a mile and a half in length. The total cost was £152 15s.; the revenue derivable from it is £13 19s. The other main laid down since 1870 is that to Acton Park. There is only one consumer upon that main. The cost was £177 5s. 9d.

Mr. MICHAEL: What is the revenue derived from it?

Mr. SALISBURY objected to the witness being thus asked the nature of a private arrangement made between the company and Mr. Lonsdale.

The COMMISSIONER, after some discussion on the point, ruled that the question might be put.

Cross-examination continued: Mr. Lonsdale pays £117 per annum, which is the amount agreed upon. The consumption is 521,000 feet. Last year we used 3227 tons of coal, 60 tons of which was used for purposes other than for gas-making. We made 24,869,000 feet of gas, of which 21,262,000 was sold. The largest quantity sold in one day has been 120,000. The coal carbonized in 1872 was 2749 tons 12 cwt., and the gas made was 23,205,000 feet, of which 19,424,000 feet was sold. We get 12 cwt. of coke from a ton of coal. The average price we obtained last year for coke was 15s. 10½d. per ton, and in the year before 8s. 8½d. We get 4s. 10d. a ton for ammonia, and 18s. 8½d. a ton for tar. Our earnings in 1871 were £1220 17s. 1d., and we paid in dividends and interest £1714 4s. 2d—£1514 for dividend, and £166 4s. 6d. for interest. In 1872 we took for dividends £1435 odd. In 1873 we earned £1147, and we paid £307 in interest and £888 in dividends. Our reserve-fund in July, 1869, was £2083; at the commencement of 1870 it was £1044 15s., and it is now reduced to £9 19s. 2d.

Mr. *J. Bury*, public accountant, clerk to the Wrexham Union, and auditor of the gas company's accounts, put in statistics showing the acreage, population, and rateable value of the borough and outlying townships. He said he scarcely thought an extra shilling would enable the company to pay its way; and if that were allowed by the Board of Trade, he did not think they would be in a position to pay more than £4 12s. 6d. He also stated that Mr. Fitz-Hugh, a large proprietor in Coedpoeth, had objected to entertain very tempting offers for the working of the minerals on his estate.

Mr. *William Low*, civil engineer, a managing director of the Vron Colliery Company, said he had resided in this neighbourhood since 1850, and was well acquainted with different seams of coal. After giving an account of several descriptions of coal in the Vron Colliery, he proceeded to state that in December, 1871, the price of Vron coal was 6s. 6d. per ton; from 1860 to 1871 coal averaged from 6s. to 6s. 8d. per ton; in January, 1872, it went up to 7s. 2d.; by April it got up to 8s. 6d.; in July, 10s. 10d., August, 15s.; September, 20s.; October, 21s.; November, 21s. and 20s.; December, 19s.; January, 1873, 18s.; February, 18s.; March, 20s.; April, 19s.; May, 17s.; June, 16s.; July and August, 16s.; October, 17s. 6d.; and he expected it would be 20s. next month. The witness said the rate charged for conveying a ton of coals from the Vron Colliery to Wrexham by the Great Western Railway was nearly as much as that charged for the carriage to Birkenhead, although in the one case the distance was only 4½ miles, and in the other it was about 30 miles. In his opinion the extension of the works to Coedpoeth was a very great benefit to the inhabitants of that district, and at the present time he was in negotiation with the manager of the gas-works to extend their main to the Vron, which would be the means of adding considerably to the receipts of the company.

In cross-examination, the *witness* said there was a population of from 600 to 700 living close to the pits, and he knew they were all exceedingly anxious that the gas should be brought over, and they would take it into their houses. The greater portion of the population were miners, and they lived in their own freeholds. Miners, he said, expected to live as comfortably as other men, as far as circumstances will allow.

THURSDAY, OCT. 16.

At the sitting of the court this morning, the COMMISSIONER said he had considered the application made by Mr. Michael on the previous day for certain returns made to the Board of Trade by the gas company, and he was of opinion that the information asked for should be furnished. In accordance with that view he had furnished these documents to the solicitor of the corporation.

Mr. *Walker*, the secretary of the company, was recalled, and said after the fire at the old works, a claim was made for £145, but they only obtained £130, and that was for damage to the office. The total estimated loss was £500 or £600.

Mr. *Thomas Hawksley:* I am a civil engineer, and at the present time am President of the Institution of Civil Engineers. I have known Wrexham since 1846, and I saw the old gas-works in 1869, when I was consulted by the directors as to what ought to be done in reference to extending the works, and their application to Parliament. The works were utterly unfit for the purpose of a gas-works, and even for the manufacture of the quantity of gas then required. The whole of the works were confined in 40 yards by 50 yards; in fact, I never saw such a crowded place. It was manifestly an unsuitable site for the works; and the apparatus, and a great many other things connected with it, were quite inadequate. They had been put up in a piece-meal manner. I know Coedpoeth very well, and the extension in that direction was quite proper. It is a large place, and ought to be supplied with gas. It is a place that will become very

much larger as the minerals are developed. There is no other town that could supply Coedpoeth besides Wrexham. I think the application for an additional shilling not only fair, but I am convinced that if the circumstances of the present time had existed when Parliament gave the company their Act, they would have fixed a rate of more than 1s. above 4s., to which they then limited them. They would, at least, have given them 1s. 6d., if not more. Coal was no doubt cheap when the corporation opposed the bill of 1870. At that time it was 9s. a ton, now it is 20s., and may be higher. I have just returned from a tour through Nottinghamshire, Yorkshire, Staffordshire, and part of Lancashire, and in all these places I find that prices are rising. As to there being more inquiries of this sort, much will depend upon the result of this. It was my opinion in 1870 that the price should be 4s. 6d. If a tax were put upon sugar, the grocer would raise the price of that article; and if by a combination of coalowners the price of coal is raised, the price of gas ought to be raised, for the maximum price mentioned in the Act was inserted when circumstances were entirely different. The company cannot manufacture gas at a profit if they only receive 4s. per 1000. I have come to that conclusion by calculation, based upon facts. I have no reason to suppose that the present high prices are temporary. I believe they will be permanent, though not to the exaggerated extent that they are now. I do not believe that with the additional shilling the company will be able to realize the profit mentioned in the Provisional Order. The increase would be equal to £1125, but the per centage mentioned in the Provisional Order applied for would require £1423. The average cost of coal in the retorts is 20s. 9d., and the residual products would be equal to 5s. 9d. a ton, which makes the net cost 15s.; and in round numbers a ton would produce 7000 feet of gas. The cost per 1000 would therefore be 2s. 2d.; and the working expenses would be 1s. 4d. per 1000 feet. Then we have to pay interest on £7500 at 4½ per cent., which is £337 10s. per annum. A dividend of £4 12s. 6d. on £27,500 would be £1271 17s. 6d., and these come to 1s. 6d. per 1000, supposing 22½ millions are sold this year, instead of 21½ millions. You will find that these figures come to 5s. per 1000 feet. The 1s. 4d. is exclusive of a reserve-fund or renewals, for it refers to actual working expenses, and not, for instance, to the relaying of mains. The relaying of mains ought to be charged to capital. The Act in reference to these applications uses the word "sum" paid, and not how much "earned," and the sum paid by the company during two years has been £2847 12s. 6d., the average being £1423 16s. 3d. The company in 1871-2 divided £1541 6s. 4d., and in 1872-3 £1306 6s. 2d. I have examined the existing works, and it is my opinion that there has not been any improper or unnecessary expenditure of capital. They are very good and cheap works. They were not built under my superintendence, nor from my design, and therefore I am unprejudiced in dealing with the question. It was contemplated when they went for their Act in 1870 to extend their works, and there is a schedule in their Act describing the very land on which the works now stand. The old works were complained of by everybody, and in fact they were a nuisance. The present works are suitable for the district, and in a few years they will be fully utilized. No new works are fully utilized at first. If the works had been taken two miles out of the town, more expenditure would have been the consequence. I estimate the sacrifice in leaving the old works at about £5000, but I believe it was a wise sacrifice; and when the town increases, and more capital becomes necessary, it will be looked upon as a mere "fleabite," and will disappear practically.

Cross-examined: The ground on which the new works are erected is different from the old site. The new ground is not saturated, nor will it be.

This was the case for the company.

Mr. MICHAEL, in opening the case for the corporation, submitted that under the Act, if the Board of Trade granted a Provisional Order, they were not bound to prescribe the amount of dividend to be paid. The proviso was, that in no case should they fix a price which would pay more than 5 per cent., nor a higher rate than had been paid in the two preceding years. In estimating the dividend paid during the two preceding years, it must mean dividend paid out of earnings during that period, and not dividend supplemented with the accumulated surplus earnings of previous years. A company which had earned antecedently 12, 13, or 14 per cent. was not justified in taking their surplus fund and subdividing it over new capital raised in 1870 in order to pay maximum dividends. That would be offering a premium to companies to retain an excess of profits in order to secure themselves from a loss of dividend. This company never had power to create a reserve-fund, because they were not under the Gas Clauses Act until the Act of 1870 was obtained. Before that time they were merely under the Joint-Stock Companies Act, which allowed them to have a contingent-fund. Out of that fund, and not out of a reserve-fund, they had paid their dividends. It was not money earned during the period, but money that belonged to this fund. If from accidental circumstances, and the great rise in the price of coal and other materials, a gas company was placed in such a position that they could not carry on their works except at a loss, or at so small an amount of profit as did not justify them in continuing the undertaking, it was provided that they should pay on an average of what they had earned during the two years immediately preceding. He directed attention to the position in which gas companies were placed, as opposed to the sellers of bread or sugar. The Legislature had seen fit to give them a monopoly for the supply of an article of daily consumption; but they said, in return for that monopoly, we will place you under regulations and restrictions, and you shall only have the benefit of the monopoly so long as you conform to the regulations. We regard you as trustees for the benefit of the shareholders, and after you have paid a dividend at a prescribed rate, you shall in truth be trustees for the public, in order to see that the profits are reduced. He maintained that every pound of capital was expended not simply in the interest of the shareholder, but of the consumer, who was injured by every pound of capital expended if it did not bring in a proper revenue. Suppose this company thought fit to expend £50,000—because it was quite competent to them under the powers of the Act to extend their mains to other places—they might have come that day to ask for that amount, although there might not be a single shilling arising from the public expenditure of the money. He repeated, the company were really in the position of trustees, not to expend their money as a commercial undertaking—though that was the primary consideration so far as the shareholders were concerned—but there was something infinitely beyond that in regard to a gas company. It was a commercial company carrying on business for the profit of the persons whose money was embarked in it; and secondly, to see that the persons who used the gas should be supplied at the lowest possible rate consistent with the prescribed rate of dividend paid to the shareholder. Therefore, the Corporation of Wrexham were perfectly right in saying, "Before we allow £1000 a year to be charged on the gas consumer—1s. on two million feet of gas would come to about £1100—we ought to know whether this large amount of capital which has been expended is necessary in the interest of the gas shareholder, and, secondly, in the interest of the gas consumer." Their answer would be directed to a few points. First, had the money been wisely expended in extending mains to outlying districts, and, what was of much greater importance, had it been expended wisely and necessarily in relation to £14,000 for new works? The total amount expended on mains was £3400. They had it in evidence in round numbers that £1000 had been expended within the one-mile radius for the purpose of improving the supply by enlarging the mains. Therefore he deducted that amount, and there was £400 allowed for two other branches, one to Cefn and the other somewhere else. He did not consider the company had acted in any way illegally; that was no part of his case. He never intended by any single word of his to say so, and he might safely say that no such thought ever passed through his mind. They acted, no doubt, in the interest of the shareholders, and as they were advised; but they had not acted wisely. They ought not to have expended this £14,000. Then he thought he ought to calculate what was the amount of profit they ought to have. There was the £3400, out of which he took £1000, and £400 for the two small branches, which left £2000 for the three miles extension to the village of Coedpoeth. Now, they had it as an established fact that for that £2000 outlay they had received, from 42 consumers, a revenue of £130. They must have borrowed the £2000 in order to lay down this main, and that money was borrowed at the rate of 4½ per cent., which took £90 out of £130, the annual revenue, leaving a net revenue of £40 a year as the whole sum which they had derived to pay for the 521,000 feet of gas they supplied to these 41 consumers. Now, that gas cost them over £70, and they had incurred a loss of £34 9s. 4d. on that extension. They had a reply. They said, "It is very unfair that you should treat that as the ultimate revenue that we are going to derive, because we are going to supply a district containing a population of 4000 people and spreading over 1200 acres." His answer to that was, "Wait until the time comes. Was it not unfair that the ratepayers should be called upon to pay while you are waiting and maturing the profit on the scheme you have devised? You have chosen to take the risk; and it is hard that you should ask us to make an addition to the amount of profit you now want that will bring it up to £100." No one had asked them to do this. There was not a single public light, and no single authority under any old or recent Act had put up a light, or had asked them to put their mains in. Not a consumer was to be found along these two miles; it was a turnpike road between fields. Gas companies laboured under the fallacy that when a fixed dividend was inserted in an Act the Government thereby granted them the rate of profit; and, while the provision said you shall not divide more, they thought they might say you shall not divide less. What he had to say was this, that it never was contemplated, when their Act was applied for, that new works should be erected. They (the company) endeavoured to bolster up their case by saying that circumstances had occurred which justified the construction of new works. What were the circumstances? The circumstances of a fire from which they recovered £130 in insurance, the total loss being put down at £500 or £600. Now, could that loss justify them in having wasted £12,000 in the erection of new works? for he at once struck out the £2000 which they said was necessary for the erection of a new gasholder. He had read the report of 1869, in which the directors told the shareholders that their now extensive works were becoming so complete that for many years to come they would be adequate to the supply of gas for this district. Were the circumstances altered since 1869? And Mr. Hawksley had stated in 1870 that the works were admirably fitted for the supply of gas, and they were able to store 200,000 feet of gas. But the maximum make at present was only 120,000 feet. He had no doubt that the existing works were admirable works, and that it had been for the interest of the shareholders to expend the capital. The learned commissioner knew very well that when shares were at a premium it was to the interest of the company to issue new shares, and if £15 was received for £10 shares, the £5 went into the pockets of the shareholder, and in this case they know that the shareholders had asked for 400 more shares than had been issued. No doubt the works were well constructed, but it did not help his case even if they were beautiful and admirably fitted; but was it necessary to erect these works to supply Wrexham with gas? He would say that the evidence distinctly proved that it was not.

Mr. *Thomas Walker* was recalled, and in answer to the commissioner, said that on the new works there were four beds of retorts with seven retorts in each. The company could get 3500 feet from each retort; but they were now repairing three beds. They did not find it necessary to use them all now, but they should use them all further on in the year.

Mr. *J. B. Murless* (ex-Mayor of Wrexham) said he was one of the largest gas consumers in the borough. His bill was about £130 a year. When the company promoted their bill he took a leading part in opposing it. The Town Council wanted the maximum price to be 4s. instead of 4s. 6d. It was then argued by the council that if the company removed their works into the country it would increase the capital. He knew of no reason to justify the increase of works. He generally got a good supply from the old works, except when new retorts were being laid down. He should think that the present site was as great a nuisance as the old one. The Town Council never called upon the company to increase their supply, lay down mains, and so expend money.

Cross-examined: In reference to his evidence given before the parliamentary committee, he explained the mode of opposition by the Town Council to the passing of the original Act for the erection of the gas works. Ten per cent. was not an unreasonable profit, under certain circumstances. If by doubling the capital the company reduced their profits, he thought the company had no right to ask him as a ratepayer to make it up. He thought the present per centage somewhat extravagant, under existing circumstances. As far as he was individually concerned, he should like to see the company get their 10 per cent. for the supply of the town, but he did not think he ought to pay for that provided for other people. He thought if the profits realized by the company were 10 per cent. on £12,000, and 5 per cent. on £3500, that it would not be too much for them to realize; but he was not aware that the gas company's profits were less than he had named. He did not think the 4½ per cent. paid for the £7000 was too high a rate of interest. When he first came to Wrexham, he paid 5s. 6d. per 1000, and it was afterwards reduced to 4s. 10d., and owing to pressure on the then existing company it was reduced to 4s. per 1000, and then the people were satisfied. Still the price was high when compared with other towns. The reduction caused the breaking up of a company then about being formed. He did not object to the bill the gas company were trying to obtain, but to some of its details. The petition presented by the council was chiefly against monopoly, and he agreed with it. He did not agree to a clause in the bill in reference to certain moneys being expended upon the erection of new works. He was satisfied with the present site. For many months after the company had got their Act the gas was very bad; but the supply on the whole had been satisfactory.

Mr. *Hugh Davies* (inspector to the rural sanitary authority, and formerly the borough surveyor) said he took part in the opposition to the company's bill in 1870. He thought their works ought to be further removed from the town than they were. The present site of the works was as bad as the other. The site of the gasholders was an objectional one; it is at a greater elevation than it should be placed for equal distribution of the gas through the town. It was useless to spend so large an amount of money as they had done on the new works. He thought the public authority now paid about £530 for gas for the public use. There would be about 2000 people in the township of Coedpoeth, which it was proposed to supply with gas. There were several places more thickly populated than that in the district. From Wrexham Church to the end where the mains were laid down was four miles; there were two miles of the road without houses. In 1870 the company were extending their works, and the council was given to understand that mains had been laid in the town which would be sufficient for years to come.

Cross-examined: He was not borough surveyor in 1870. He thought the site of the old works was a very bad one; there being a lot of quicksands about it. Mr. Walker had bought that site and built a large malt-kiln there, and he gave his opinion as to the reason why the building was so secure. He thought £12,000 would have been enough to spend on the new works, including mains and everything. He had no objection to gas going to Coedpoeth, providing it was not done at his cost. He did not think Moss ought to be supplied under present circumstances. The company had had to spend more money in putting

up the new gas-works on this site than they would have done if they had obtained a better site.

Mr. *George Wilson Stevenson* said he had analyzed the company's accounts from 1870 to 1873. He found that their capital had been increased, though the profits earned were less than sufficed to pay the dividends upon the original capital. In 1870 the capital was £15,000, and the gas consumed 16 million feet. Since that year the business had increased less than 30 per cent., and the capital had increased 133 per cent. He thought the works owned by the company in 1870 were largely in excess of the requirements of the town. The storeage capacity of a work ought to be equal to the largest day's consumption. The present storeage is 20,000 feet in excess of requirement. Since 1870 the gas had increased 8 per cent. in consumption, and the capital 72 per cent. In 1872 the increase of capital was 28 per cent., and in the previous year 72 per cent.. At the present time the capital was £35,000, whilst the gas supply was 21,500,000 feet; that was £1600 per million feet of gas, The amount of capital contrasted with the amount of business was enormously large, and he knew of no other instance in the kingdom where the capital was so large for the business done. The usual proportion was from £500 to £600 per million. If the capital had increased in the same ratio as the business, it would only have amounted to £19,500; 4s. per 1000 feet of gas would have provided a dividend of 6½ per cent. upon the capital which ought to exist, in addition to the capital which existed in 1870. In the year 1870 the expenditure was £3793 2s. 5d., and deducting profit and loss, £590 10s. 6d., £3202 11s. 7d. remained. There must also be deducted meter-rents, residuals, and fittings, £522 13s. 1d., leaving a net sum of £2679 18s. 10d., which, divided by the sale of gas in the year, gave net cost at the consumers meters of 3s. 5·65d. In 1871, it was 2s. 8d.; in 1872, 2s. 5½d.; and in 1873, 2s. 10½d. In 1870 there was earned on the capital £3 15s. 8d. per cent.; in 1871. £5 5s. 6d.; in 1872. £4 8s. 9d.; in 1873, £3 1s. 2d. He thought it was extremely unwise for the directors to leave the old works; they should have been utilized and worked out, because a considerable portion, according to the evidence, was new retort-houses being built at the time they applied to Parliament.

Mr. Salisbury, having replied at some length upon the evidence, expressed his thanks to the commissioner for the very able manner in which he had presided over the court.

Mr. Michael also tendered his thanks to the commissioner, and the inquiry then terminated.

[Up to the time of going to press, no decision has been come to on this case.]

INSTITUTION OF CIVIL ENGINEERS.

The Council of this Institution have issued a list of subjects, upon which they invite communications, for the session 1873-4. Among these are the following:—

On the Constant Service of Water Supply, with special reference to its introduction into the Metropolis, in substitution for the Intermittent System; and on the Waste of Water, and the best Apparatus for its Prevention.

On the various Modes of Dealing with Sewage, either for its Disposal or its Utilization.

On the Separate System of Sewering Towns, with a detailed description of the works in a town to which this system has been wholly or partially applied, and particulars as to the results.

On the Ventilation of Sewers, with a *résumé* of the Experiments as to the Motion, Pressure, &c., of Gas in the Sewers.

On the Application of Steam as a Motive Power for Pumping Water or Sewage, with a comparison of the advantages of different classes of Engines, and details of the cost of working for long periods.

On the various Descriptions of Pumps employed for Raising Water or Sewage, and their relative efficiency; and on the Employment of Water as a Motive Power for Pumping, by means of Water-Wheels, Turbines, Water-Pressure Engines, or other Machines.

On the Present State of Science in regard to the Manufacture of Gas for Illumination, and on the materials most suitable for the purpose.

On the Manufacture of Mineral Oils, and the Lamps best adapted for their Consumption in Dwellings and Lighthouses.

Presentation of a Testimonial to Mr. Joseph Clark.—On Monday, Oct. 27, a silver loving cup, value £44, was presented by the workmen of the Imperial Gas Company, at their works in Margaret Street, Haggerston, to Mr. Joseph Clark, on the occasion of his retirement from the position of chief engineer to the company. There were 400 men present, and the chair was taken by Mr. Walter Paxon, supported by Mr. Hersee; also by Messrs. Clark, junior. The place was handsomely decorated, and flowers and evergreens encircled the cup. Mr. Paxon, in presenting it, made a suitable speech, in which he adverted to the great amount of respect and esteem in which all connected with Mr. Clark held him. Mr. Clark, in thanking the contributors, said he had always tried to do good to his fellow-men, and he was glad to see this valuable present, as it assured him that his endeavours were not unsuccessful. Refreshments were provided for the workmen by Mr. Clark, and, during the evening, the band of the company played several select pieces. A very agreeable evening was spent. On the cup was inscribed the following:—"Presented to Joseph Clark, Esq., as a token of respect, upon his retirement as chief engineer, by the *employés* of the Imperial Gas Company.—Shoreditch Station, October, 1873."

Gas Stokers Strike at Croydon.—During the past week the gas consumers in Croydon have had to put up with an insufficient pressure of gas in their shops, warehouses, and offices. This has arisen mainly through a strike at the gas-works, and partly through the early and unexpected frost. With reference to the cause of the strike, it appears that the late stokers, being dissatisfied with the rate of wages paid them, appealed to the directors by letter for a considerable increase. The directors, who were willing to treat them fairly in the matter, applied for information upon the subject to about a dozen of the surrounding suburban gas companies. The result was that the wages paid to the Croydon stokers were found, with but one or two exceptions, to be as high as those paid elsewhere, but the make of gas per ton of coals carbonized was not satisfactory, compared with the make of other companies. The manager, after taking all the circumstances into consideration, recommended the directors to increase the stokers pay on a certain scale for an increased make. The directors agreed to accept this recommendation, and to try it for one month, at the end of which time if it were found satisfactory it was to be continued. The stokers, however, with but one exception, refused to accept this offer as an answer to their application for increased wages, and gave notice on Friday, October 17, to leave in a week from that date. This time has expired, and they have all left. Several of them since taking this step have made overtures with a view to returning, but it has been decided not to again engage them. Their places have been temporarily filled up by the service layers, fitters, and labourers employed on the works, and it is hoped that a permanent staff of men may be found, and everything be in order again within a few days. Of course this strike has caused great inconvenience and anxiety to the directors and their manager, and great praise is due to them that under these difficulties they have been enabled to ensure a constant supply of gas, and have merely had to check the pressure during a few nights. In consequence of threats made by some of the men, police constables have been constantly on duty day and night to protect the men employed and the property and machinery of the company.

Register of New Patents.

APPLICATIONS FOR LETTERS PATENT.

3291.—Silber, A. M., Whitecross Street, and Farquhar, J. F. C., Long Acre, "Improvements in the construction of lamps and lanterns or similar apparatus used for lighting purposes, and in apparatus for heating purposes." Oct. 10, 1873.

3305.—Bamber, W., Openshaw, near Manchester, "An improved gas-burner to be employed for gassing yarn." Oct. 11, 1873.

3308.—Newton, H. E., Chancery Lane, Middlesex, "An improved mode of connecting gas, water, or other pipes." A communication. Oct. 11, 1873.

3314.—Manwell, J., Glasgow, "Improvements in charging horizontal retorts, and in apparatus therefor." Oct. 13, 1873.

3318.—Muir, J. S., Leeds, "Improvements in manufacture of petroleum oils and spirit and like hydrocarbons for the manufacture of gas therefrom." Oct. 14, 1873.

3319.—Muir, J. S., Leeds, "Improvements in the manufacture of gas." Oct. 14, 1873.

3327.—Surmon, H. J., Belvedere, Kent, "Improvements in apparatus for manufacturing gas." Oct. 14, 1873.

3343.—Lake, W. R., Southampton Buildings, London, "Improvements in double-acting lift and force pumps." A communication. Oct. 15, 1873.

3353.—Clark, A. M., Chancery Lane, Middlesex, "Improvements in the manufacture of artificial fuel, and in the production of gas for illuminating and heating purposes." A communication. Oct. 16, 1873.

3372.—Belt, A., New Cross, Kent, "Improvements in safety gas-burners." Oct. 18, 1873.

GRANTS OF PROVISIONAL PROTECTION.

2749.—Musgrave, J., and Shillington, J. F., Belfast, "Improvements in stoves, and in apparatus connected therewith for heating." Aug. 20, 1873.

2842.—Walsh, W. J., Birmingham, "Improvements in gas and other lamps." Aug. 28, 1873.

3138.—Beale, J., East Greenwich, Kent, "An improved engine to be used for pumping gases, air, or fluids." Sept. 26, 1873.

3219.—Harrop, J., Manchester, "Improvements in taps or valves." Oct. 4, 1873.

3224.—West, J., Maidstone, Kent, "Improvements in apparatus used in the manufacture of gas." Oct. 4, 1873.

3225.—West, J., Maidstone, Kent, "Improvements in apparatus used in the manufacture of gas." Oct. 4, 1873.

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NOTE.—Quotations given for the small, which for Gas and Coke results is equal to the large.

THE Steam Stoker Company, Limited, invite TENDERS for the construction and erection of FOUR STEAM STOKING MACHINES at the Fulham Works of the Imperial Gaslight and Coke Company, London.

The drawings and specification can be seen on and after the 10th inst., at the Offices of the Steam Stoker Company.

Tenders are to be sent on or before the 24th inst., sealed and endorsed "Tenders for Imperial Machines," and addressed to the undersigned, at the Offices of the Company.

The Directors do not bind themselves to accept the lowest or any tender. By order,

William Gibson, Secretary.

155, Fenchurch Street, Nov. 3, 1873.

THE Steam Stoker Company, Limited, invite TENDERS for the construction and erection of TWO STEAM STOKING MACHINES, at the Salford Corporation Gas-Works, Liverpool Street Station, Salford.

The drawings and specifications can be seen on and after the 10th inst., at the Corporation Gas Office, Lamb Lane, Salford, and also at the Offices of the Steam Stoker Company, 155, Fenchurch Street, London.

Tenders are to be sent on or before the 24th inst., sealed and endorsed "Tenders for Salford Machines," and addressed to the undersigned, at the Offices of the Company.

The Directors do not bind themselves to accept the lowest or any tender. By order,

William Gibson, Secretary.

155, Fenchurch Street, Nov. 3, 1873.

Demy 16mo., Sixty-four pages,

ADVANTAGES of GAS. By J. O. N. RUTTER. A new edition.—201st Thousand. Brighton: Published by the Author.

This little book is intended for distribution by Gas Companies and the manufacturers of gas apparatus. It has done good in making known the benefits and promoting the sale of gas; and it is hoped that its usefulness might be continued and greatly extended.

Prices:—1000 copies, £8; 500 copies, £4 5s.; 250 copies, £2 5s. And smaller number at 20s. per 100 copies.

A specimen copy free per post for three penny stamps. Covers printed specially.

Apply to J. O. N. Rutter, Black Rock, Brighton.

Nov. 13, 1871.

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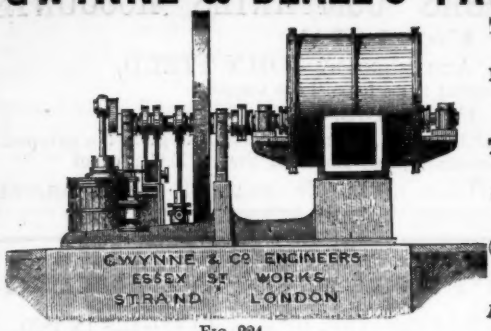

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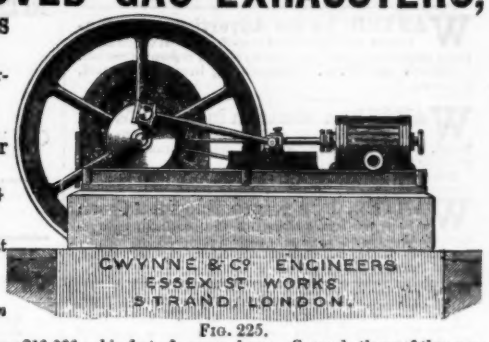

FIG. 224. FIG. 225.

Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the **most perfect system of action yet discovered.** Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 52,500 cubic feet per hour. GWYNNE AND Co. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the **excellence of the article produced,** and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 300 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

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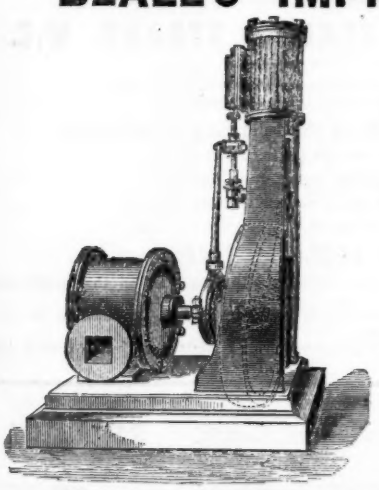

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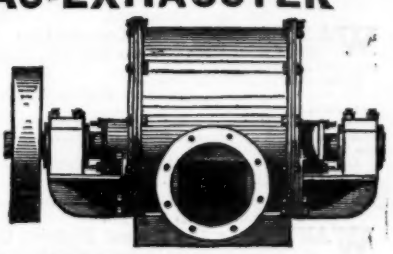

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WANTED, by a young man, a situation as Meter Fixer, Fitter, Index Taker, &c.
Address A. Z., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by the Advertiser, a situation as MANAGER of Gas-Works. Has had many years experience, and has been 9 years in present situation.
Address Mr. W. G. WILLIAMS, 42, Brunswick Street, SWANSEA.

WANTED, a situation in a Gas-Work as COLLECTOR or INSPECTOR, or both combined, having been many years in present situation. Can produce security.
Address H. H., General Post-Office, SWANSEA.

WANTED, by a respectable man (been some years in a large Gas Company), an engagement as Gas-Fitter, Tinman, and Meter Repairer.
Address L. M. G., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Manager, who speaks and writes Italian fluently, to take charge of the Gas-Works of a town in Italy, having a population of 20,000 inhabitants.
Apply by letter, addressed GASOMETER, care of Mr. Lawless, 13, Philpot Lane, LONDON, E.C., stating age, experience, and salary.

WANTED immediately, a Gentleman who understands the process of Gas Purification, to call on Gas Companies for ORDERS for a Purifying Material five years in use, and to keep account of delivery and receipt of same. Unexceptionable references required.
Address A. B., Post-Office, Bradford, near MANCHESTER.

WANTED, by a practical man, a situation as MANAGER or FOREMAN of a Gas-Work. Thoroughly understands the manufacture, distribution, and testing of gas, also the setting of retorts with the introduction of hot air. Good references and testimonials as to character and abilities.
Address G. L., 52, New Weston Street, Long Lane, Bermondsey, S.E.

WANTED, a Gas Engineer and Manager for the Ottoman Gas Company's Works at Smyrna. Requisites for the office: A good knowledge of gas-making and engineering, of the French language, and of book-keeping. Security required. Salary, with commission, not less than £450 a year, with residence.
Applications to be sent to the SECRETARY, 85, CHEAPSIDE.

WANTED, an engagement as Manager of a medium-sized Gas-Work. Thorough practical knowledge of the working and setting of retorts and manufacture and distribution of gas. Testimonials as to character and ability extending over 12 years.
Address W. D., care of G. E. Child, Gas Engineer, Southwold, SUFFOLK.

TO GAS ENGINEERS.

WANTED, by the Corporation of Limerick, an ENGINEER, to take charge of and manage the Gas-Works.
He is not to reside on the premises.
He will be required to commence duty on the 1st of next January.
Personal attendance not being necessary, proposals, enclosing testimonials, will be received on or before Thursday, the 13th of November.
All proposals to be addressed to the CHAIRMAN, Corporation Gas Committee, LIMERICK.
Oct. 22, 1873.

GAS AND WATER.

WANTED, by the Barnet District Gas and Water Company, a resident ENGINEER, who is well acquainted with the manufacture and distribution of gas, and competent to undertake the management of both the Gas and Water Works. He will be required to devote the whole of his time to the company. Salary £175 per annum, with residence on the works, coals, gas, and water; also special advantages to be derived in proportion to the success of the Company's business.
Applications, with copies of testimonials, to be sealed and addressed to the CHAIRMAN, and marked "Application, Engineer," and to be sent under cover to the Company's Accountant, Mr. ALFRED LASS, 60, Cornhill, LONDON, on or before the 12th inst.—By order of the Board.
60, Cornhill, London, Nov. 1, 1873.

TICKHILL.

MANAGER of Gas-Works. Applicants are hereby informed that a Manager has been appointed.

MR. HEDLEY, C.E., may be Consulted upon all matters connected with Gas, Water, and Sanitary Improvements. He is specially prepared to undertake Parliamentary, Legal, and Rating Cases, and to act as Arbitrator or Referee.
Mr. HEDLEY has devoted great attention to the vexed question of the Supply of Gas to Street Lamps, and refers to his Evidence given before Parliament upon the Birmingham, Nottingham, Metropolis, City of London, Luton, and other Gas Bills.
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Pamphlet for Gas Companies to circulate amongst their gas consumers to increase day consumption, &c.
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COST PRICE SHEETS.

MANUFACTURE AND DISTRIBUTION OF GAS. These sheets are the same as were laid before the Dublin Meeting of the British Association of Gas Managers; but in the REPRINT, NOTES have been added for the guidance of those using them. Copies of the two sheets may now be had, price 5s.
South Shields, January, 1873. W. J. WARNER.

AN ANALYSIS
OF THE
METROPOLITAN GAS COMPANIES ACCOUNTS
For 1872.
COMPILED AND ARRANGED BY JOHN FIELD,
Chief Accountant to the Imperial Gas Company.
Price 10s. 6d.
Can be obtained from the AUTHOR, at 26, Arundel Square, Islington, N., per post; of EDEN FISHER, Stationer, 50, Lombard Street, E.C.; or of
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11, BOLT COURT, FLEET STREET, E.C.

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To be had of Mr. W. B. KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.
Price 2s. 6d., post free.

"The first paper read was on the 'Setting and Working of Retorts,' by Mr. E. S. Cathels, of the Crystal Palace District Gas-Works. This was an exhaustive, and, to gas managers, an invaluable paper on the apparatus used in one of the most important processes in the manufacture of gas. It is a subject to which the author is well known to have given special attention, and we therefore commend his paper to the careful notice of those of our readers who are interested in the production of gas."—*From a Leading Article in "Engineering," on June 10, 1870.*

RETORT-SETTINGS.
MR. CATHELS
IS PREPARED TO SUPPLY
TRACINGS OF DETAILED WORKING DRAWINGS
OF HIS
IMPROVED RETORT-SETTINGS
(FROM 1 TO 9 RETORTS IN A BED),
ADAPTED FOR EITHER COKE OR TAR AS FUEL,
Showing Plans, Transverse and Longitudinal Sections, and Elevations; easily understood by any retort-setter or bricklayer. These Settings are excellent gas producers, with great economy in fuel.
For terms, &c., apply to E. S. CATHELS, ASSOC. INST. C.E., GAS-WORKS, MONTREAL, CANADA.

"On the proper mode of setting the retorts the prosperity of a gaslight establishment mainly depends."—*Vide Peckstone's Treatise on the "Manufacture of Gas."*

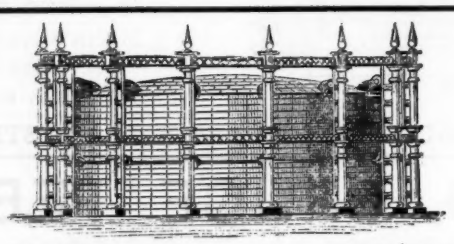
GEORGE ANDERSON,
GAS AND CONSULTING ENGINEER,
19, NORTHUMBERLAND STREET, STRAND, W.C.

MR. ANDERSON advises Companies on all matters connected with the manufacture of Gas and the construction of Works.

PATENTEE and MANUFACTURER of the following Inventions:—
RETORT SETTINGS, heated by tar without the production of smoke.
STEAM-ENGINES and EXHAUSTERS, separately or combined.
FOUR-WAY VALVES, one of which is equal to three ordinary Valves.
STATION GOVERNORS—the Gasholder cannot tilt and cause accident.
BREEZE AND TAR FUEL MACHINE.

A Pamphlet containing Eighteen Illustrations of the foregoing, with letterpress on the construction of Works, post free, 2s. 6d.
N.B.—The second edition of this Work, *now ready*, contains illustrations of the Machine for converting Breeze and Tar into Fuel for heating the Retorts.
"The Author is well qualified to speak authoritatively upon the important subjects to which his pamphlet refers."—*Artizan.*

HOPE IRON WORKS,



STOCKTON ON TEES.

ASHMORE & WHILE,
GAS ENGINEERS & CONTRACTORS,
MANUFACTURERS OF GASHOLDERS,
GAS APPARATUS OF EVERY DESCRIPTION,
Including Improved
Retort-Lids, Boilers, Cast and Wrought Iron Tanks, Iron Roofing, Bridges, Girders,
And GENERAL IRONWORK.

N.B.—Estimates for all Gas Plant and Remodelling supplied on application.

TO GAS COMPANIES.

WANTED, by the Advertiser, a re-engagement as MANAGER of a medium-sized Gas-Works. Thoroughly conversant with the manufacture and distribution of gas. Has been at present employment nine years. First-class references. Is used to the photometer and testing.
Address J. G. S., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—A small Gas-Work in good condition, including 4 8-ft. iron retorts, gasholder 12 ft. by 8 ft., purifier, condenser, and connexions.
Apply to Mr. WATMORE, Gas-Works, MAIDENHEAD.

FOR SALE—A Sulphate Ammonia CHAMBER and DRAINER (made by Nelson, of Bolton). As good as new.
May be seen, and particulars obtained, on application to the undersigned.
Gas-Works, Lancaster. WM. FLEMING.

WANTED, by the Chesterfield Water and Gaslight Company, a good SMITH, who can work at main or service laying when not at the fire.
Also a Foreman STOKER.
Applications, stating age, wages expected, and enclosing testimonials, or reference to last employer, to be made to the undersigned. Ability and strict sobriety indispensable, and preference given to men who have filled similar situations. CHARLES E. JONES, Manager.

FARINGDON GASLIGHT AND COKE COMPANY.

THE Committee of Management of the above Company are desirous of LEASING the Works of the said Company, situate in Faringdon, in the county of Berks, for the term of five years, from the 25th day of December next, and any contractor or other person desirous of renting the same and carrying on the business thereof is requested to send in a tender for the same, addressed to the undersigned, on or before the 13th day of November next.
The lowest or any other tender not necessarily accepted.
Dated the 24th day of October, 1873.
JOHN HUNT, Clerk to the above Company.
Faringdon, Berks.

NO. 528, December 31. 1872, of the JOURNAL OF GAS LIGHTING. Wanted.
Any person having a clean copy to DISPOSE OF can obtain the marked price, together with cost of postage, on sending it to C. S. E., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ON SALE, cheap, and in good condition,
One wrought-iron SCRUBBER, 14 ft. by 5 ft.
One cast-iron SCRUBBER, 17 ft. by 4½ ft.
One vertical CONDENSER, with seven double rows of 8-in. pipes 20 ft. high.
Apply to Mr. LONGWORTH, Dukinfield, MANCHESTER.

THE NEW GAS COMPANY, LIMITED.

THE Directors of the above Company are ready to receive APPLICATIONS from owners of existing Gas-Works, as well as from others erecting or about to erect new works, and to grant Licences for the use of the Patents.
Apply to the SECRETARY, 22, WALBROOK, E.C.

WHITEHOUSE AND COMPANY, LIMITED,

GLOBE TUBE-WORKS, WEDNESBURY; & VICTORIA TUBE-WORKS, GREAT BRIDGE, STAFFORDSHIRE,
MANUFACTURERS OF
PATENT WELDED WROUGHT-IRON TUBES,
FOR GAS, STEAM, AND WATER;
GAS-FITTERS TOOLS, STEAM COCKS, AND ALL KINDS OF JOINTS.
HYDRAULIC TUBES, CORE BARS, TELEGRAPH POSTS, COILS, &c.

London Agent—ALFRED LAKEMAN, 18, IRONMONGER LANE, CHEAPSIDE, E.C.

GAS PURIFICATION.

JOHN WM. O'NEILL AND CO.,

CONTRACTORS FOR
GAS PURIFICATION BY OXIDE OF IRON,
39, LOMBARD STREET, LONDON, E.C.

HODGE & CO.'S

IMPROVED VENTILATING SUN-LIGHTS
WITH TALC REFLECTORS AND SELF-ACTING VALVES
TO PREVENT DOWN-DRAUGHT;
VENTILATING GLOBE LIGHTS for DINING-ROOMS, LIBRARIES, &c.
Ormolu, Bronze, & Crystal Gaseliers;
MEDIÆVAL CHURCH WORK AND CORONÆ
COCKS, VALVES, and FITTINGS for GAS, STEAM, and WATER;
COLUMNS, BRACKETS, & STREET LANTERNS;
BLACK AND GALVANIZED BARREL COMPO AND TIN PIPE.
GAS ENGINEERS,
100, HATTON GARDEN, LONDON.
Drawings and Prices upon application.

VICKARYS AND ROBERTSON,

Late JOHN VICKARY,
ESTABLISHED 1840,
GAS ENGINEERS, CONTRACTORS, IRON AND BRASS FOUNDERS,
WEST OF ENGLAND ENGINEERING WORKS, EXETER.
GASHOLDERS AND TANKS,
Retorts, Retort-Fittings, Condensers, Scrubbers, Purifiers, Station-Meters, Governors, Rack and Screw Valves. Gas and Water Mains always in Stock.
STEAM-ENGINES, EXHAUSTERS, SHAFTING AND GEARING, &c.
GAS-FITTINGS,
Including Chandeliers, Pendants, Hall Lamps, Brackets, Star and Sun Lights of all designs.
WET & DRY GAS-METERS,
Combining most recent improvements in principle and manufacture; upwards of 200,000 already in work, giving highest satisfaction.
(A guarantee of five years given with every Meter.)
PLUMBERS WORK, including Lift and Force Pumps; Cocks for Gas and Water and Steam; Brass Fittings.
HYDRAULIC AND GENERAL ENGINEERING
LONDON OFFICE: 8, JOHN STREET, ADELPHI, W.C.

IMPERIAL CONTINENTAL GAS ASSOCIATION.
(INCORPORATED BY ACT OF PARLIAMENT.)

NOTICE is hereby given that the HALF-YEARLY ORDINARY MEETING of the Proprietors of the Imperial Continental Gas Association will be held at the City Terminus Hotel, Cannon Street, London, on TUESDAY, the 25th inst., at Two o'clock in the afternoon precisely, when a Report will be made to the Proprietors, a Dividend declared for the half year ended the 30th of June, 1873, and the usual ordinary business of such meeting transacted.

Notice is hereby also given that the Transfer Books of the Association, and the Register of Shareholders, will be closed on Tuesday, the 11th inst., and will remain closed until after the Half-Yearly Ordinary Meeting on the 25th inst.—By order of the Board of Direction,

ALBERT F. JACKSON, Secretary.

30, Clement's Lane, Lombard Street,
London, Nov 3, 1873.

THE Scarborough Gas Company, owing to the removal of their works, will have FOR SALE, about October, 1874, the following APPARATUS, the whole of which is in exceedingly good condition :—

Fittings for 140 Retorts, consisting of mouthpieces, ascension, saddle, and dip pipes, and hydraulic and foul mains.

A Condenser, consisting of 40 12-in. pipes, with top and bottom boxes, and inlet, outlet, and bye-pass valves.

Two Scrubbers, each 7 ft. diameter and 16 ft. high, with valves as before.

Two Purifiers, 8 ft. 6 in. square and 5 ft. deep, 20-in. water lutes.

Two Cast-iron Water-Tanks, respectively 24 ft. by 16 ft. by 4 ft., and 20 ft. by 8 ft. by 4 ft. New in 1865.

Two Horizontal Engines, 4 h. p., two single-flue Cornish boilers, and two 20,000 feet per hour Beale's Exhausters. All new in 1866.

One Station-Meter, by Milne, 20,000 feet per hour. New in 1864.

One Gasholder 80 ft. diameter, in two 24-ft. lifts. About 11 years old.

One Gasholder 50 ft. diameter, in two 22-ft. lifts. Only 4 years old.

Two Governors, by Parkinson, on 12-in. and 10-in. mains.

A considerable length of 10-in. Cast-iron Socket and other Pipes.

An inspection of the above Apparatus is requested by the Officers of Companies requiring enlargements or extensions, and offers to purchase will be duly considered.

By order of the Board,
JAMES MOON,
Manager and Secretary to the Company.

Now ready, price 1s. 6d., post free,
THE GAS CONSUMER'S MANUAL;
OR,
How to obtain Good Light and Cheap Gas.

Being a Popular Exposition of the Chemistry of Gas Lighting, with Practical Instructions in the best methods of burning Gas for Lighting, Cooking, and Heating; and Suggestions as to the proper Sizes of Interior Pipes, Arrangement of Lights, &c., &c.

ILLUSTRATED.

Also, price 2s. 6d., post free,
ON SETTING AND WORKING RETORTS.

A Revised and Illustrated Reprint of a Paper read at the Annual Meeting of the British Association of Gas Managers in 1870.

By E. S. CATHELS, Assoc.Inst.C.E., Montreal, Canada.
London:
WILLIAM B. KING, 11, Bolt Court, Fleet Street, E.C.

CLAYTON'S PATENT SIX-WAY VALVE only requires one valve to work two purifiers; saves more than three-fourths of the connexion-pipes; requires neither tees, elbows, nor bends; no racks or springs to get out of order.

For particulars, apply to CLAYTON, SON, & Co., Gas Engineers, Hunslet, LEEDS.

CATHELS & TERRACE'S Patent Four-WAY DISC GAS-VALVE is the simplest and best Valve for Purifiers, and as a By-pass for other apparatus in Gas-Works. It is always gas-tight, and has no springs, ground faces, or other delicate parts. By its use the flow of the gas cannot be accidentally stopped, and it never sticks.

For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, Foundry and Brass Works, ROTHERHAM.

CATHELS'S Patent District Dry Gas-GOVERNOR is the only perfect self-acting contrivance for Regulating the Pressures in the higher levels of a district.

For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, ROTHERHAM.

THE THAMES BANK IRON COMPANY,

(Successors to LYNCH WHITE,)
SUPPLY FROM STOCK

CAST-IRON RETORTS, SOCKET-PIPES for GAS or WATER PURPOSES, FLANGE-PIPES for STEAM, RAIN-WATER PIPES and GUTTERS, HOT-WATER PIPES and BOILERS, and all requisite Connexions for same; also LAMP-COLUMNS, LAMPS, WROUGHT FRAMES, WROUGHT-IRON TUBING, &c., &c.

All kinds of Gas-Works Apparatus and General Castings made to Pattern or Drawing.

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OLD BARGE WHARF, UPPER GROUND STREET, LONDON, S.E.

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GAS ENGINEERS,

GLOBE METER-WORKS, OLDHAM,

MANUFACTURERS OF

IMPROVED CONSUMERS GAS-METERS,

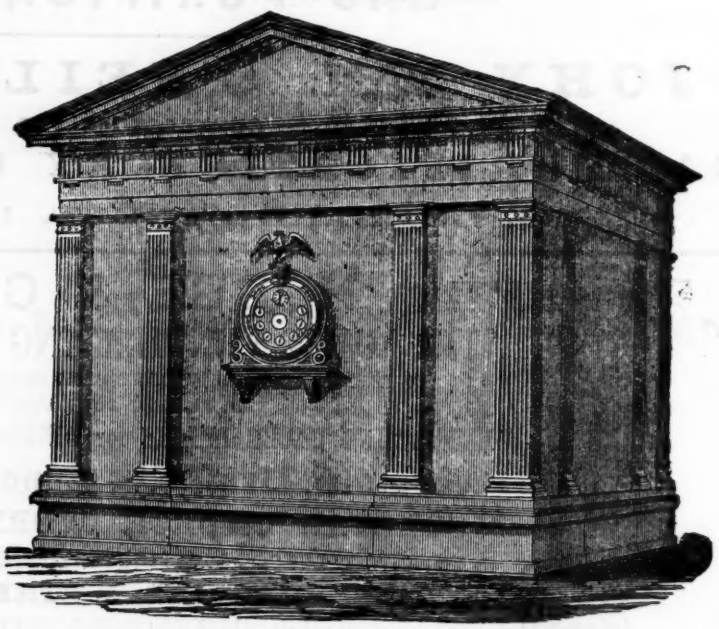
Of the best material and workmanship, carefully adjusted to the requirements of the British Sales of Gas Act and Foreign Standards of Measures.

PATENT FIXED WATER-LINE GAS-METERS,

Which are uniform with the ordinary Meters, and register with minute accuracy.

IMPROVED DRY GAS-METERS,

IN BEST TINNED IRON CASES.



GAS STATION-METERS,

WITH PLANED JOINTS.

GOVERNORS, GAUGES, INDICATORS, EXHAUST-GOVERNORS, &c.

Home and Foreign Orders promptly attended to.

All Sizes of CONSUMERS METERS, STATION-METERS, and GOVERNORS generally in Stock.

Orders almost invariably despatched on the day of receipt.

TERMS, &c., ON APPLICATION.

LIME SUPERSEDED
IN THE
PURIFICATION OF ILLUMINATING GAS,
BY
Spence's Patent Dry Copperas,

The only Purifying Material which removes, by one process, all Ammonia and Sulphuretted Hydrogen. It has been in use for upwards of four years at some of the largest Gas-Works in the Kingdom.

TESTIMONIALS SENT ON APPLICATION.

SPENCE BROTHERS CHEMICAL COMPANY, LIMITED,
VICTORIA CHEMICAL WORKS, ASHTON NEW ROAD, BRADFORD, MANCHESTER,

Manufacturers of SPENCE'S PATENT DRY COPPERAS;

SPENCE'S PATENT GAS DEODORIZER COPPERAS;

SULPHATE OF AMMONIA, GREY AND BROWN; SULPHURIC ACID, &c.

CONTRACTORS FOR THE PURCHASE OF SPENT OXIDE.

ALL COMMUNICATIONS TO BE ADDRESSED TO THE WORKS.

ALFRED WILLIAMS,

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64, BANKSIDE, SOUTHWARK, LONDON, S.E.

GAS ENGINEER AND CONTRACTOR FOR THE ERECTION OF GAS-WORKS,
AND FOR THE
SUPPLY OF RETORTS, FIRE-BRICKS, CAST-IRON MAINS,
AND ALL MATERIALS FOR GAS MANUFACTURE AND DISTRIBUTION.

ESTABLISHED 1844.

WHITLEY PARTNERS,

RAILWAY WORKS, LEEDS,

ENGINEERS, FOUNDERS, AND LICENSEES;

MANUFACTURERS OF IMPROVED STEAM-ENGINES, BOILERS, PUMPS, &c.;

MAKERS, BY SPECIAL MACHINERY, OF PATENTED MECHANICAL INVENTIONS,

Comprising numerous Labour-saving Appliances and Economizers of Fuel and Motive Power;

CONTRACTORS TO THE EUROPEAN & COLONIAL GOVERNMENTS & CORPORATIONS;

MERCHANTS AND SHIPPERS OF MACHINERY, METALS, AND HARDWARE;

AWARDED

THE FIRST PRIZE MEDAL AT THE EXPOSITION UNIVERSELLE, PARIS, 1867, "For Improved Construction, Excellence of Material, and Superior Workmanship;"
TWO GRAND GOLD MEDALS AT THE MOSCOW INTERNATIONAL EXHIBITION, 1872;
ALSO THE FIRST PRIZE MEDALS AT LEEDS AND LYONS IN 1858, 1868, and 1872.
"REDUCTION IN PRICES OF PEET'S VALVES, consequent upon largely increased sales."

ILLUSTRATED CATALOGUES AND ESTIMATES ON APPLICATION.

Correspondence conducted in English, German, or French.

Samples of Specialties may be inspected at Stand No. 542, Group XIII., in the English Machinery Annexe of the Vienna Exhibition, 1873. For List of same see German Official and "British Section" Catalogues.

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GEORGE NEWTON,

UNION STREET WEST, OLDHAM,

BRASS FOUNDER AND FINISHER,

MANUFACTURER OF

IMPROVED WET AND DRY CONSUMERS GAS-METERS,

LAMP METERS AND BOXES,

GOVERNORS, GAUGES, INDICATORS, EXHAUST & PRESSURE REGISTERS,

GAS STATION-METERS,

With all the joints planed.

TERMS, &c., ON APPLICATION.

SAM. CUTLER & SONS,

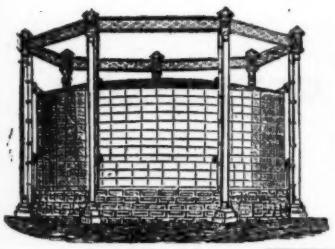
CONTRACTING GAS ENGINEERS,

GASHOLDER & GENERAL GAS APPARATUS MAKERS,

MANUFACTURERS OF

BOILERS, IRON ROOFING, IRON BRIDGES,

AND GENERAL IRONWORK.



S. C. AND SONS undertake Contracts of any magnitude for the **Erection of new and Remodelling of existing Gas-Works**, for **Gasholders, Cast and Wrought Iron Tanks, Iron Roofs**, and every description of **Apparatus** for the Manufacture and Distribution of Gas.

Special attention is invited to their **"Improved Condenser,"** which is very effective, and much approved; also to their patterns of **Annular** and other **Condensers, Scrubbers,** and **Purifiers,** of all sizes, which they arrange either with **Centre** or Ordinary **Slide Valves.**

WORKS FOR THE SUPPLY OF

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S. C. AND SONS undertake the **Supply** and **Laying** of **Mains** for **Gas and Water,** and supply all Castings, Connexions, and Fittings for Retort-House, Works generally, and for Streets. They also supply **Valves** of all descriptions, Iron and Clay Retorts, Hotpressed Retort-Lids, Steel Charging-Scoops of improved make, for which they have special machinery, Improved Coke and Coal Barrows, Cross-Bars and Screws, Bolts and Nuts, Furnace and Stoking Tools, Iron and Wood Purifier-Sieves, Lead, Yarn, Borings, &c., including every requisite whatsoever for a Gas-Work, a well-assorted stock being kept of those goods most in request.

SOLE MAKERS OF BRETT'S PATENT COKE BARROW.

Experienced Retort Setters sent to any part of the Kingdom.

Address: PROVIDENCE IRON-WORKS, MILLWALL, LONDON.

SAMUEL PONTIFEX, Consulting Gas Engineer, having retired from the Great Central Gas Company, is now prepared to furnish PLANS and SPECIFICATIONS, as well as ADVISE Provincial Gas Companies as to the erection of new, or alteration and enlargement of existing works.
Offices: 22, Coleman Street, LONDON, E.C.

MR. WILLIAM DORE (19 years Gas Engineer and Accountant) may be CONSULTED upon all matters relating to the manufacture and distribution of gas, and the management, accounts, or transfer of gas undertakings.
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MR. NORWOOD EARLE, late of the Dover Gas-Works, is prepared, after 17 years experience, to undertake the duties of SURVEYOR to Gas Companies and Corporations in all matters relating to the Distribution of Gas and Gas Testing. Contracts entered into for the Survey of Mains, Services, Public Lamps, &c., in order to reduce the per centage of unaccounted-for gas to the lowest possible amount.
Valuations for Assessment, Transfer, and other purposes.
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Mr. ALFRED LASS,
60, CORNHILL, LONDON, E.C.,
Is prepared to open the Books, and, if necessary, keep the Accounts of Gas and Water Companies.
To examine the Books and Accounts, and prepare Balance-Sheets for the information of Directors.
To assist Secretaries in preparing Balance-Sheets, according to the "Gas-Works Clauses Act, 1871;" or may be consulted with respect to Accounts generally.

ADDISON POTTER,
WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE,
Manufacturer of Clay Retorts, Fire-Bricks and every description of Fire-Clay Goods.

BRONNER'S PATENT GAS-BURNERS give 99 per cent. of light, as compared with 27 per cent. given by ordinary burners, with equal consumption of gas.—*Vide* "Gas Referees Report," published June, 1869.
HENRY GREENE AND SON, Sole Consignees of Brönner's Patent Improvements in Gas Lighting, 16 and 17, King William Street, LONDON, E.C.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 20 & 22, WHARF ROAD, CITY ROAD, LONDON, N.,
Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water Works, including Iron Retorts, Socket and Flange Pipes, Bends, Branches, and Syphons of all sizes, Lamp Columns, &c., &c.
N.B.—Orders for Cast-Iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention. CHARLES HORSLEY, Agent

BELGIAN CLAY RETORTS.

J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.
Communications addressed to J. SUGG & CO., GHENT, will receive immediate attention.

TO GAS COMPANIES.

GEORGE McKAIG,
MANUFACTURER OF
GAS-PURIFYING WOOD SIEVES,
153, CLEVELAND STREET,
DONCASTER.
It requires but one trial to prove the Superior Make, Strength, and Durability of these Sieves.

FIRE-CLAY RETORTS.

WILLIAM FRASER,
INVERKEITHING,
(Owner of the Works at which Fire-Clay Retorts were first made), can supply
RETORTS, FIRE-BRICKS, &c.,
to any extent.
References can be given to managers of above a hundred Gas-Works whom he supplies.
He ships at Charlestown his
CELEBRATED HALBEATH STEAM COALS,
on Navy List.

B. CARPENTER'S
IMPROVED WOOD SIEVES
FOR
GAS PURIFIERS & SCRUBBERS.
WORKS:
22, HERMES STREET, PENTONVILLE ROAD,
LONDON, N.
The above Sieves are used by all the Gas Companies in London and a great many in the country. Their utility, durability, and cheapness combined, render them superior to all others.
Testimonials from Gas Engineers who have tested their qualities forwarded on application.
All orders punctually attended to, and estimates given if required.

THE IMPERIAL METER COMPANY, LIMITED,

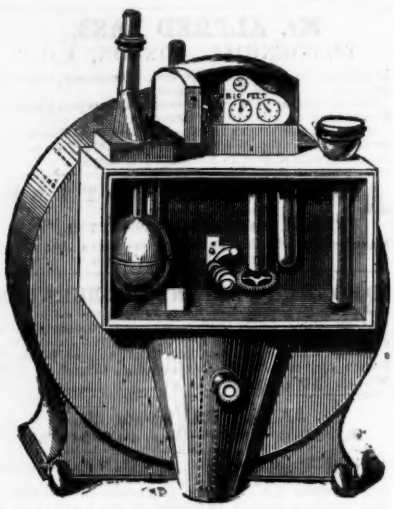
MANUFACTURERS OF

WET AND DRY GAS-METERS,

PRESSURE-GAUGES AND GOVERNORS, AND STREET-LAMP REGULATORS.

FACTORIES:

KING'S ROAD, LONDON, N.W., and GRAY'S INN ROAD, LONDON, W.C.



Front View.

THE

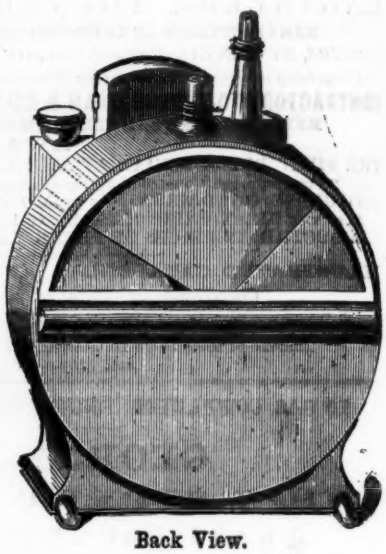
IMPERIAL

COMPENSATING

WET GAS-METER.

DE CASTRO & BURTON'S

PATENT.



Back View.

I. **This Meter is more simple in construction than the common non-compensating Meter.**
II. **An unvarying water-line is maintained.**
III. **No amount or kind of pressure will cause it to "flood."**
IV. **It is practically unaffected by "tilting."**
V. **The friction is less than in any other Meter; and**
VI. **It will last for twelve months without requiring to be refilled.**

THE IMPERIAL METER COMPANY, LIMITED, ALSO MANUFACTURE COMMON NON-COMPENSATING WET GAS-METERS OF ALL SIZES, BOTH IN TIN AND CAST-IRON CASES.

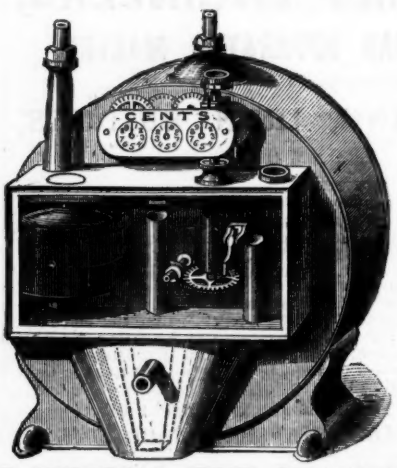
THE COMPENSATING

WET GAS-METER

IS UPHELD FOR

TEN YEARS

WITHOUT CHARGE.



THE IMPERIAL WET GAS-METER.
Non-Compensator.

STATION-METERS

WITH PLANED JOINTS,

AND

GOVERNORS,

MADE TO ORDER.

Mr. GEORGE MACKANESS will represent this Company in the Provinces.

OFFICES: 41, FLEET STREET, LONDON, E.C.

W. MOORE, Secretary.

☞ *All Communications to be addressed to the Secretary.*

THE IMPERIAL METER COMPANY, LIMITED,

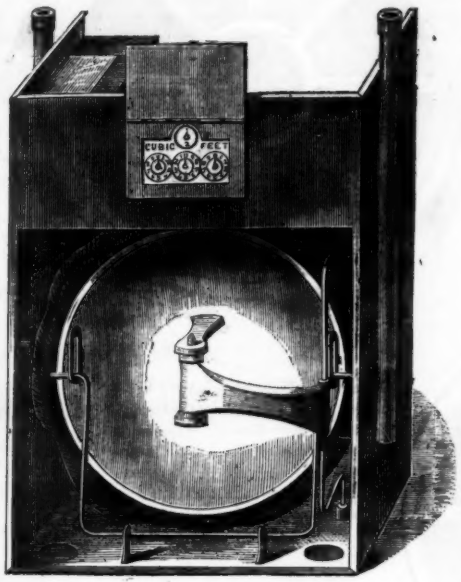
MANUFACTURERS OF

WET AND DRY GAS-METERS,

PRESSURE-GAUGES AND GOVERNORS, AND STREET-LAMP REGULATORS.

FACTORIES:

KING'S ROAD, LONDON, N.W., and GRAY'S INN ROAD, LONDON, W.C.



Front View.

THE

IMPERIAL

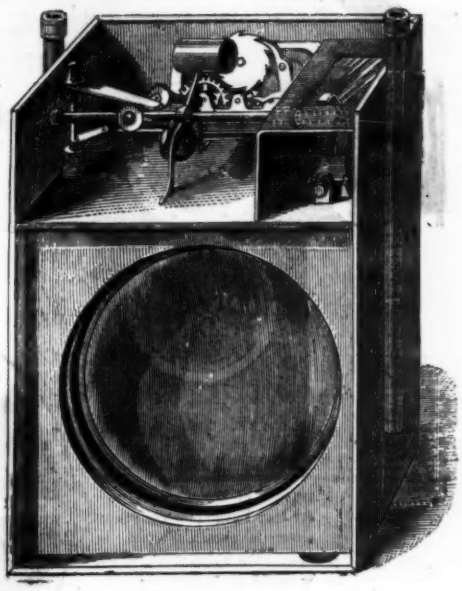
DRY

GAS-METER

SINGLE DIAPHRAGM.

TELLING & JOHNSON'S

PATENT.



Back View.

I. The mechanical construction of this Meter is simpler and stronger than any other.
II. About half as much leather is used as in ordinary dry Meters.
III. The Meter has only one valve, and this cannot "stick."
IV. The lights maintain perfect steadiness and strength of flame. There is no "draw."
V. The gas consumed can only be measured from the inlet to the outlet, and
VI. The index cannot be made to register backwards.

THE IMPERIAL METER COMPANY, LIMITED, ALSO MANUFACTURE ORDINARY DOUBLE DIAPHRAGM DRY GAS-METERS OF ALL SIZES, BOTH IN TIN AND IN CAST-IRON CASES.

SPECIAL ATTENTION

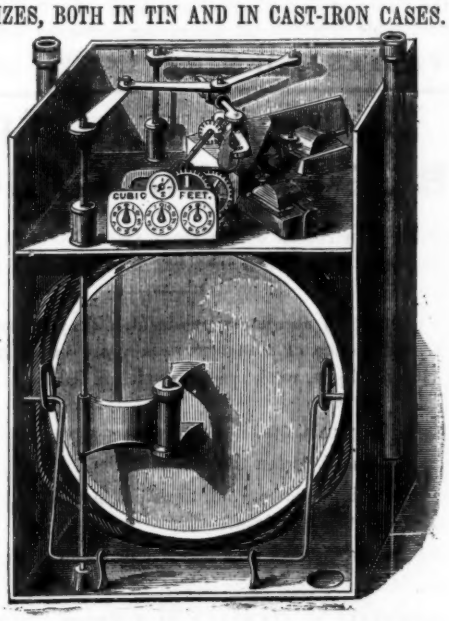
IS PAID TO THE

MANUFACTURE OF

STREET-LAMPS

AND

REGULATORS.



EVERY

DRY GAS-METER

IS UPHELD FOR

SIX YEARS

WITHOUT CHARGE.

THE IMPERIAL DRY GAS-METER.
Double Diaphragm.

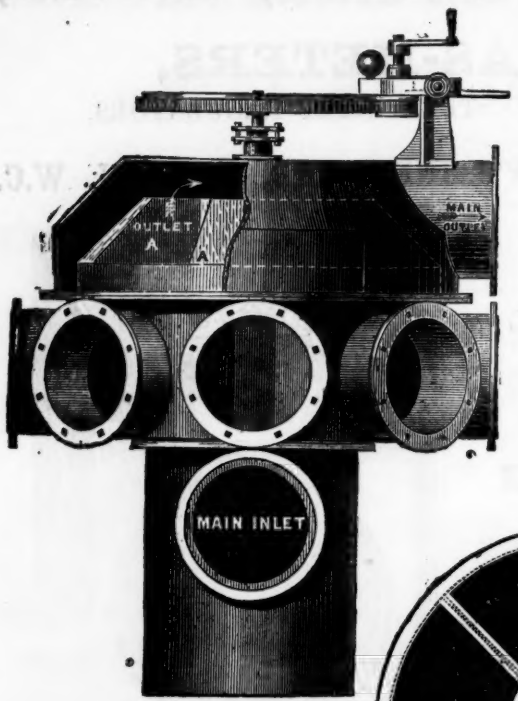
Mr. GEORGE MACKANESS will represent this Company in the Provinces.

OFFICES: 41, FLEET STREET, LONDON, E.C.

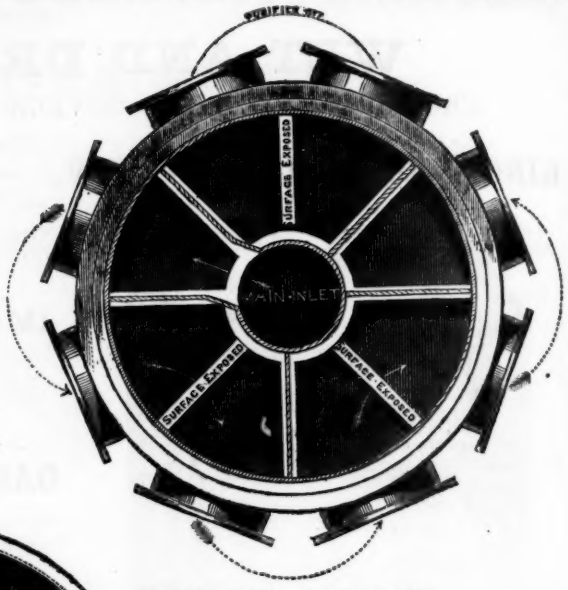
W. MOORE, Secretary.

☞ *All Communications to be addressed to the Secretary.*

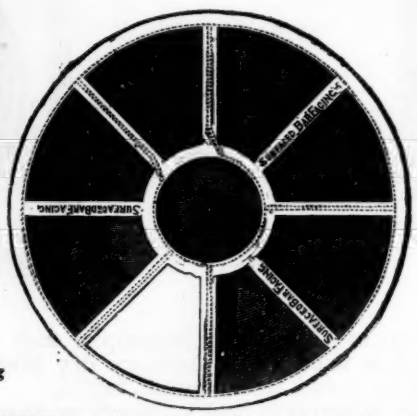
C. & W. WALKERS' PATENT CENTRE-VALVES.



Elevation of the Centre-Valve for four Purifiers. The safety cover is shown broken, to enable the Valve itself, which is inside, to be seen.



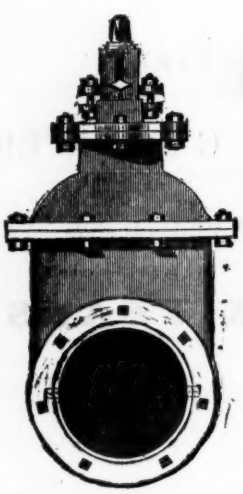
Plan of the Body, showing the Valve lying in it, with three of the facings, which were formerly exposed to settlements of dirt, carbon, naphthaline, &c., but which are now always covered by the surfaced bar-facings of the Valve. (See below.)



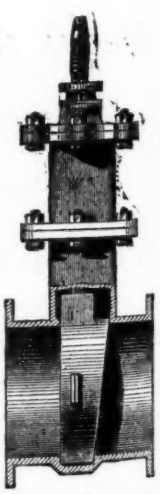
Plan of the Valve, or upper portion, showing the surfaced bar-facings referred to above.

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A very considerable improvement and saving is effected in the cost of the connecting-pipes.

FOUR-WAY CENTRE-VALVES FORMING INLET, OUTLET, AND BYE-PASS.



C. & W. WALKERS'
DOUBLE-FACED GAS-VALVES.



These solidly constructed double-faced Gas-Valves are superseding the old system of the light, single-faced disc, which is too uncertain and unreliable in large bores.

They are guaranteed absolutely gas-tight. They are very massive and rigid, and by improved modes of manufacture they are produced at very little excess in cost over the old light, weak system, which is liable to spring and bend, and become leaky.

The Valve is a rigid wedge of solid cast iron, having two perfectly scraped surfaced facings fitting between the two on the body, which are also surfaced.

A spring in two short halves, and, therefore, not liable to break, is used only for scraping the front facing clean.

The front facing is vertical; the back facing forms the wedge.

At a slight additional expense both flanges are faced to bolt to main-pipes.

GASHOLDERS, TELESCOPE & SINGLE-LIFT, of LARGEST DIMENSIONS.

PURIFIERS, SCRUBBERS, CONDENSERS of most Improved Description.

WOOD SIEVES FOR PURIFIERS,

Which have now been in use for more than ten years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.

MIDLAND IRON-WORKS, DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

JAMES MILNE & SON,

GAS ENGINEERS,

Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,

EDINBURGH, AND

2, KING EDWARD STREET,

NEWGATE STREET, LONDON.

STATION-METERS, GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,

And every description of Gas-Fittings and Gas Apparatus.

SCHOLL'S

PATENT PLATINUM

GASLIGHT PERFECTER.

Extract from Report by Dr. Letheby:—

"The results have been very remarkable, for they show an average increase of 63 per cent. on the illuminating power of the gas. I am of opinion, therefore, that the invention is of great practical value."

Extract from Dr. Frankland's Course of Lectures at the Royal School of Mines, February, 1868.

"Scholl's Platinum Perfecter is one of the most important inventions of modern times in connexion with the burning of coal gas."

Price 1s. each for Fishtail Burners.

To be had retail of Gas-Fitters and Ironmongers.

JOHN SCHOLL, Manufactory: 41 & 42, BERWICK STREET;

Retail Depot: 198a, OXFORD STREET, LONDON, W.

Terms on application. N.B.—A specimen sent free on receipt of Twelve stamps.

*** Further testimonials from Drs. Frankland and Crooks, showing the great practical value of this invention, will be shortly published.

THE PATENT

"UNIVERSAL" STEAM PUMP.

SOLE MAKERS,

HAYWARD, TYLER, & CO.,

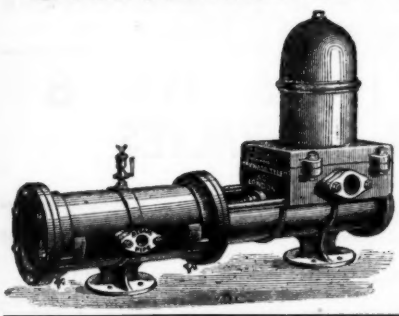
84 & 85, UPPER WHITECROSS STREET, LONDON, E.C.

IN USE IN SOME OF

THE PRINCIPAL GAS-WORKS IN LONDON, SHEFFIELD, PENISTONE, &c.,

FOR

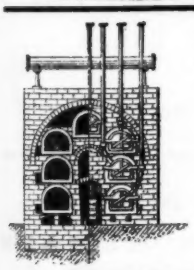
TAR AND AMMONIACAL LIQUORS.



Ardwick Bridge Chemical Works, Manchester, Oct. 28, 1872.

Sir,—The "Universal" Steam Pump obtained from you, and which has been employed during the last six months pumping caustic soda at these works, still continues working satisfactorily.—Yours truly,

(Signed) PETER HART, *Manager.*



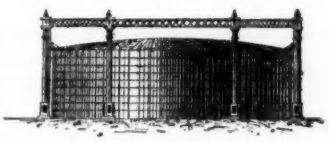
HENRY SKOINES,

PATENTEE

AND

CONTRACTING GAS ENGINEER,

FOR



SETTING RETORTS,

ERECTING AND REMODELLING GAS-WORKS

Of any extent, at Home or Abroad,

Address, 7, ARGYLE STREET, KING'S CROSS, LONDON, W.C.

JOSEPH AIRD,

WELLINGTON TUBE-WORKS,

GREAT BRIDGE, TIPTON,

STAFFORDSHIRE,

MANUFACTURER OF

PATENT WELDED WROUGHT-IRON TUBES AND FITTINGS.

BAILEY'S Patented Inventions are now in extensive use wherever steam is known. Bailey's Patent Steam Gauges, Pyrometers, Water Gauge Cocks, Test Pumps, Fusible Plugs, Steam and Water Valves, Safety Valves, Junction Valves, Pumps, Tell-Tales, Recorders, Lightning Conductors, Electric Telegraphs, Turret Clocks, Steam Joint Cement, Lifting Jacks, Boiler Feeders, Lime Catcher and Separator, Injectors and Ejectors, and every description of first-class Brass Work for Engines and Boilers. Gas-Works Managers who have not our large book should send for it.

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THOMAS CARR & SON,

MANUFACTURERS OF

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SCOTSWOOD FIRE-BRICK WORKS,

NEAR

BLAYDON-ON-TYNE.

E. GODDARD,

GAS-WORKS, IPSWICH,

SOLE AGENT FOR

EDGE'S PATENT

FOR REMOVING THE

CARBONACEOUS INCRUSTATION FROM GAS-RETORTS.

INTERNATIONAL EXHIBITION, 1862.

CLASS X.

PRIZE MEDAL

For excellence of Fire-Clay Gas Retorts, and "HONOURABLE MENTION" for good quality of Fire-Bricks.

WILLIAM STEPHENSON & SONS,

THROCKLEY,

NEWCASTLE-ON-TYNE.

TO GAS COMPANIES, ENGINEERS, &c.

WOOD SIEVES.—WOOD SIEVES.

Estimates given and Contracts taken by the Manufacturer

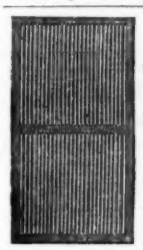
GEORGE MACKANESS,

36, EDWARD STREET, HAMPSTEAD ROAD,

LONDON, N.W.

These Sieves are made with parallel or bevel bar, and guaranteed to be well seasoned yellow deal, and not common spruce so generally used.

N.B.—Specimens sent free on application.



DEMPSTER'S

RENOWNED

WOOD SIEVES,

WITH TAPER BARS,

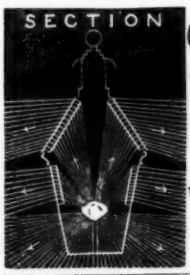
MADE BY MACHINERY

CAPABLE OF MAKING 10,000 FEET WEEKLY.

References to Hundreds of First-Class Engineers.

ROSE MOUNT IRON-WORKS,

ELLAND, NEAR HALIFAX.



THE PATENT

CATOPTRIC LAMP

for Streets and all Situations where the Light ascending above the level of the Lamp is wasted,

Is now in use in Moorgate St., London, and has been in successful operation upon Waterloo Bridge since Oct. 7, 1871.

T. A. SKELTON, 37, Essex St., Strand, LONDON, INVENTOR AND PATENTEE.

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WILLIAM MACLEOD & CO.,

METAL MERCHANTS AND CONTRACTORS,

18 & 20, ALSTON STREET, GLASGOW.

CAST-IRON GAS AND WATER PIPES AND FURNISHINGS.

MALLEABLE IRON TUBE FOR GAS, WATER, AND STEAM.

AGENTS FOR THOMAS GLOVER & CO.'S

PATENT DRY GAS-METERS.

DELIVERY F.O.B. ON CLYDE.

Lists on application.

THE "TAMAR" FIRE-BRICK AND CLAY COMPANY, LIMITED, invite attention to their **FIRE-BRICKS**, which are now in use by a number of the leading firms of Lime and Cement Manufacturers, Gas Companies, &c., &c., and are pronounced equal to the best Stourbridge.

For particulars and prices, apply to the SECRETARY, 5, Great Winchester Street Buildings, LONDON, E.C.

Sept. 24, 1873.

OXIDE OF IRON.—

We are prepared to supply, on moderate terms,

HYDRATED PEROXIDE OF IRON (BOG OCHRE),

Same quality as supplied by us to several of the most extensive Gas Companies, and which has given entire satisfaction.

FRANCIS RITCHIE & SONS,

BELFAST.

HOPKINS, GILKES, & CO.,

LIMITED,

MIDDLESBOROUGH,

SUPPLY GAS & WATER PIPES of EVERY SIZE.

Plain, Turned and Bored, and Coated.

CAST-IRON RETORTS.

Castings for Gas-Works of every description.

EXHAUSTERS.

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Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.

Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

Agent in London, Mr. J. MANWARING, 101 Cannon Street E.C.

JAMES NEWTON & SONS,

(Established 1820,)

FIRE-BRICK AND TILE MERCHANTS,

Wholesale and for Exportation,

FALCON DOCK, 78 AND 79, BANKSIDE,

SOUTHWARK, LONDON, S.E.,

DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY, and every Article suitable for

GAS AND WATER WORKS.

TROTTER, HAINES, & CORBETT,

BRETTELL'S ESTATE

FIRE CLAY & BRICK WORKS,

STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICK.

Proprietors of

BEST GLASS-HOUSE POT and CRUCIBLE CLAYS.

Successors to

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WALTER MABON & CO.,

Engineers,

ARDWICK IRON-WORKS,

FAIRFIELD STREET, MANCHESTER,

MANUFACTURERS OF

IRON TANKS, GASHOLDERS,

GAS APPARATUS,

PIPES, VALVES, IRON ROOFS,

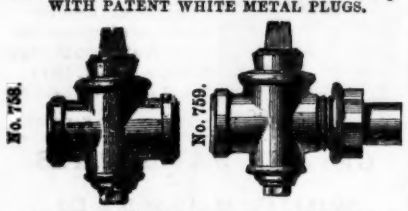
WROUGHT AND CAST IRON GIRDERS.

DESIGNS, SPECIFICATIONS, & ESTIMATES FURNISHED.

LAMBERT'S

CAST-IRON GAS-MAIN COCKS,

WITH PATENT WHITE METAL PLUGS.



The bodies of these Taps are made of Iron, black or galvanized, and the Plugs of Patent Metal. They are warranted not to set fast or corrode as do iron or brass Cocks, will always work easily, are strong, well made, durable, of little or no intrinsic value, and, therefore, not likely to be stolen; and the PRICES are (especially upon the larger sizes) FULLY 50 PER CENT. LESS THAN BRASS COCKS.

GAS-JOINTS, CHANDELIERS, PENDANTS, BRACKETS, ETC.; WROUGHT-IRON WELDED TUBE AND FITTINGS, BRASS, COPPER, LEAD, TIN, AND COMPOSITION TUBING,

Stocks, Taps, and Dies, and Every Description of Gas-Fitters Tools; Gas Slide and Sluice Valves;

CARTER'S SAFETY GAS-VALVES;

GAS-STOVES, REGULATORS, BURNERS, &c.

Pattern-Book and Price List of Gas-Fittings, supplied on application.

THOS. LAMBERT & SONS, Lambeth, London, S.E.

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MANUFACTORY AND SHOW-ROOMS:

BROAD STREET, BIRMINGHAM.

ESTABLISHED 1807.

MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS,

WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.

TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.

GEORGE ORME & CO.,

GAS-METER MANUFACTURERS, BRASSFOUNDERS & FINISHERS,

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CONSUMERS WET & DRY GAS-METERS ON THE MOST APPROVED PRINCIPLES.

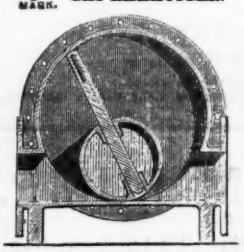
STATION-METERS, GOVERNORS, PRESSURE-REGISTERS,

And every Description of Gas Apparatus.

GAS, STEAM, AND WATER FITTINGS.

TRADE MARK.

J. BEALE'S PATENT GAS EXHAUSTER.



BEALE'S CONTINUOUSLY ACTING

GAS EXHAUSTERS

ARE NOW MANUFACTURED BY

B. DONKIN & CO.

MR. J. BEALE, of East Greenwich, having retired from business, has made an arrangement with B. DONKIN & CO. for the sole manufacture of his Patent Solid-Slide Gas Exhausters.

B. D. & Co. also make Steam-Engines to drive Gas Exhausters direct or otherwise.

Estimates and Prices on application to

B. DONKIN & CO.,

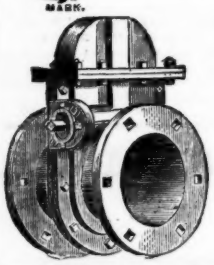
ENGINEERS & IRONFOUNDERS,

BERMONDSEY, LONDON, S.E.

B. DONKIN & CO.'S

IMPROVED GAS-VALVES

TRADE MARK.



WITH WROUGHT-IRON PINIONS,

List of prices, with full dimensions of all sizes up to 48-inch, to be had on application.

These Valves are all proved on both sides to 30 lbs. on the square inch before leaving the works, and are always kept in stock.

VALVES MADE WITH OUTSIDE RACKS TO ORDER.

ALSO,

SCREW WATER-VALVES WITH GUN-METAL FACES.

B. DONKIN & CO.,

GENERAL ENGINEERS AND IRONFOUNDERS,

MAKERS OF STEAM-ENGINES,

BLUE ANCHOR ROAD, BERMONDSEY,

LONDON, S.E.

TO GAS COMPANIES AND THE TRADE.

J. DEFRIES & SONS,

MANUFACTURERS OF

CRYSTAL, BRONZED, & ORMOLU CHANDELIERS, IMPROVED CRYSTAL STAR & SUN LIGHTS, VESTIBULE LAMPS, AND THE PATENT CRYSTAL ILLUMINATION.

A LARGE STOCK ALWAYS IN HAND OF

IRON, BRASS, COMPOSITE, AND LEAD TUBES, FOR GAS AND WATER,

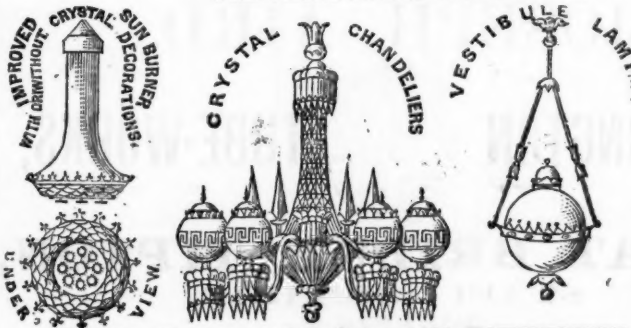
AND EVERY DESCRIPTION OF

GAS AND WATER FITTINGS.

THE PATENT DRY AND WET METER, WITH THE LATEST IMPROVEMENTS.

STREET LAMPS AND COLUMNS IN GREAT VARIETY.

WORKS: LONDON AND BIRMINGHAM.



GAS MOONS,

Cut and Engraved, of the newest designs;

GAS REFLECTORS

In Silver and Glass;

GAS NIBS

AND

BURNERS

Of every description.

Pattern-Books of Gas-Fittings, Crystal and Ormolu Chandeliers for 1873, are now complete.

City Show-Rooms and Manufactory, 147, HOUNDSDITCH, LONDON.

ESTABLISHED 1830.

OLD WEMYSS CANNEL COAL.—Yield of gas per ton, 12,896 cubic feet; illuminating power, 31·75 standard candles. Port of shipment, Wemyss.
Analysis and price on application to Mr. Wm. Carey, Manager, Wemyss Colliery, Kirkcaldy, Fife.

THE
HUCKNALL COLLIERY COMPANY
Can offer a CANNEL COAL yielding a large quantity of Gas of superior quality.
Prices and information on application to the Hucknall Colliery Company, Hucknall Torkard Collieries, near Nottingham.

POPE & PEARSON'S GAS COAL.—We have now the authority of several of the most eminent Gas Engineers of London in stating that our Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.
One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.
For further particulars, apply to Pope and Pearson, West Riding and Silkstone Collieries, near Leeds.

CANNEL COAL.
COPPA COLLIERY, MOLD,
Beg leave to call the attention of Gas Companies to the superior quality of their
CANNEL FOR GAS-MAKING PURPOSES.
This Cannel produces in actual working, in iron retorts, 9000 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.
Ports of shipment—Birkenhead or Connah's Quay.
Waggons supplied for delivery by railway to any part of England or Wales.
For particulars, prices, and rates of freight, apply to The Coppa Colliery, Mold, Flintshire.

THE MIDLAND COAL COMPANY
Are prepared to enter into CONTRACTS with
CORPORATIONS & GAS COMPANIES
FOR SUPPLIES OF
GAS COAL & CANNEL.
Prices, Analysis, and other information on application at the
MIDLAND COAL OFFICES,
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ROBERT MARSHALL,
CANNEL COAL MERCHANT,
173, ST. VINCENT STREET, GLASGOW.

RUSSEL'S BOGHEAD.
MUIRKIRK, No. 1, CANNEL
Yields 11,600 cubic feet of 34·3-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.
MUIRKIRK, No. 2, CANNEL
Yields 10,700 cubic feet of 32·77-candle gas per ton, and 9½ cwts. of coke, containing only 11 per cent. of ash.
RIGSIDE CANNEL
Yields 11,900 cubic feet of 35-candle gas per ton. Coke worthless.
Prices and full Analyses on application.

SCOTCH CANNEL COALS.
The Subscriber is prepared to contract for the supply of all the principal Scotch Cannel Coals. Prices and Analyses of the various Coals will be forwarded on application.
JAMES M'KELVIE,
CANNEL COAL MERCHANT,
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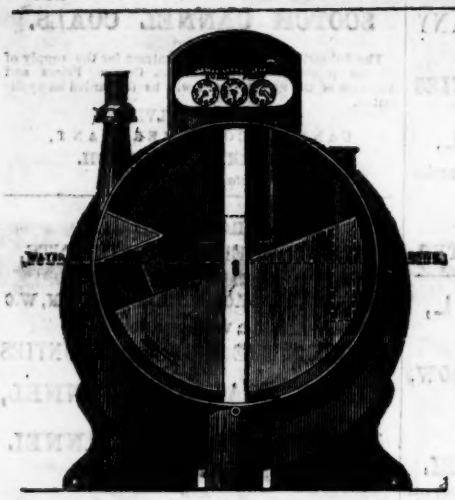

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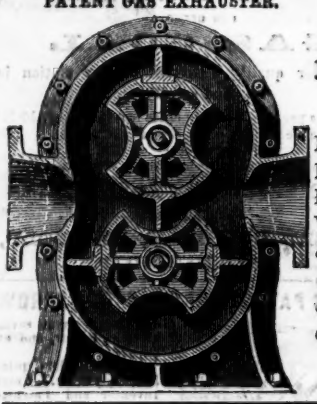

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